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GEOGRAFIE DER PLANTEN

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PLANT-MAPS FOR THE NETHERLANDS 1:3.000.000.

Part I.

Compiled by „The Institute for the Investigation of the Vegetation
in the Netherlands” (I. V. O. N.).

Introduction.

This publication is a continuation of „Plantenkaartjes voor Nederland”, published by Dr. J. W. C. GOETHART and Dr. W. J. JONGMANS in the years 1902—1908. For both publications the same methods, differing in two respects from those usually adopted elsewhere, have been employed.

As in the first place it is utterly impossible to show on a very small-scale map, the exact spot where a certain species of plant is to be found, this mock-accuracy has been avoided. Only that part of the topographical map is indicated, which contains the finding-place. With this end in view, each of the 64 sheets of the survey-map of the Netherlands is covered by a net of 48 rectangles, each side being approximately one hour's walk long (exactly 4180×5000 metres). These rectangles are called „hour-squares”, each being subdivided into 16 „quarter-hour-squares” of 1045×1250 metres. The „hour-square”, in which any special finding-place of a plant occurs, is clearly shown on a photo-lithographically reduced map with the „hour-square” division. As the scale of the reduced map is left large enough, even the „quarter-hour-square” in question can be clearly distinguished within its „hour-square”.

A second item of interest is, that from each „quarter-hour-square” as complete an inventory as possible has been drawn up of all phanerogams and vascular cryptogams. From the result of these investigations separate maps have been compiled, showing the distribution of each kind of plant, both of the common and the rarer species, and showing the „squares” in which they are located. The maps formerly published by GOETHART and JONGMANS, scale 1:1.500.000 were just large enough to show the „quarter-hour-squares”.

Since the „Institute for the Investigation of the Vegetation in the Netherlands” took over GOETHART's and JONGMANS' mapping in 1930, the compiling and inventarising has been done as follows. Each sheet of the survey-map is provided with an album of sketch-maps to a scale of

1:200.000. In this album each plant has its own map, on which every „quarter-hour-square” where the plant has been found is marked down. About one half of the 26.000 squares into which the map of the Netherlands has been divided, are more or less inventarised together with a few parts of Belgium and Germany, bordering on the Netherlands. All these data can be found in the 55 albums, covering together the whole of the Netherlands. In the „Rijksherbarium” (National Herbarium) at Leyden, where the albums are open to inspection, it is possible to trace at a glance, the distribution in any part of the country, of any special plant in which the investigator is interested.

Extracts, provided only with „hour-square” divisions, have been made from these maps, on a scale of 1:1.500.000. A reference to these extracts can therefore mean: „plant found in 1 quarter-hour-square” but also: „plant found in 16 quarter-hour-squares”. Both extremes occur. More precise data are, however, to be found in the larger cartography, which is regularly kept up to date. The extracts are now completed for all phanerogams and vascular cryptogams found in the Netherlands, up till and including the end of the year 1934, while previous data are included wherever possible, as well as notes concerning the absence of any special species.

The present edition now presents a reduced reproduction (1:3.000.000) of some of these extracts. As a first group we have chosen a number of plants which are mentioned in literature as „Atlantic”. In the Netherlands these show, apparently, a greatly varied distribution. If financially possible, one or more numbers will appear annually. They are obtainable on application, printed on one side only, in order to facilitate arrangement in any desired order, after being cut out. Should a subscriber require a map, that has not yet appeared, our secretary will be pleased to furnish this in manuscript-form. All detailed data are to be found in the 55 albums 1:200.000 in the National Herbarium at Leyden.

Our sincere thanks are due to the „Topografische Dienst” (Government Topographical Service) for its helpful cooperation.

The committee of the „Institute for the Investigation of the vegetation in the Netherlands” (I. V. O. N.):

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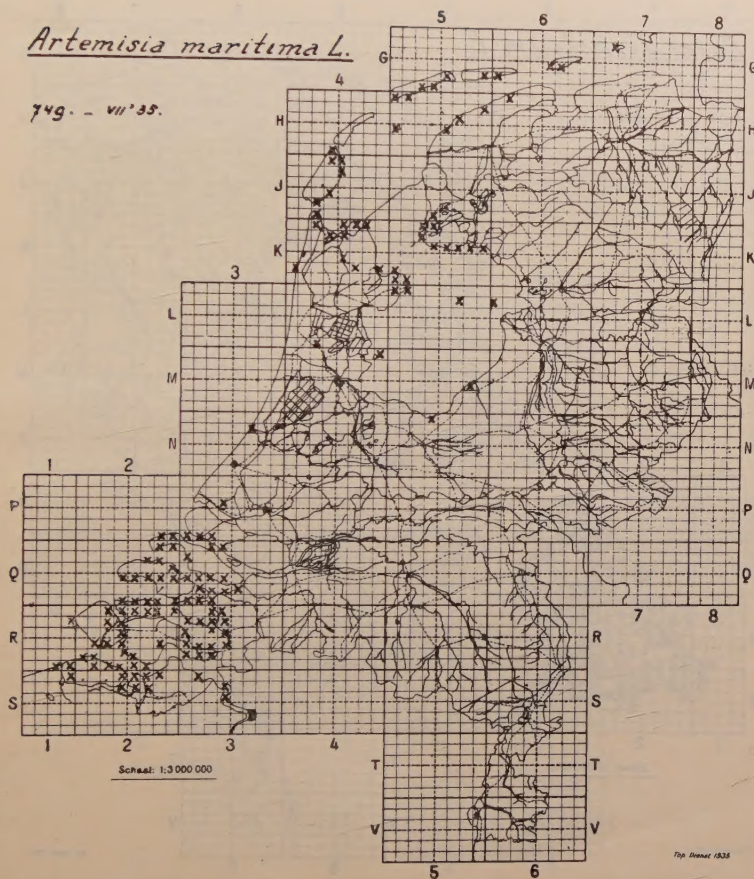
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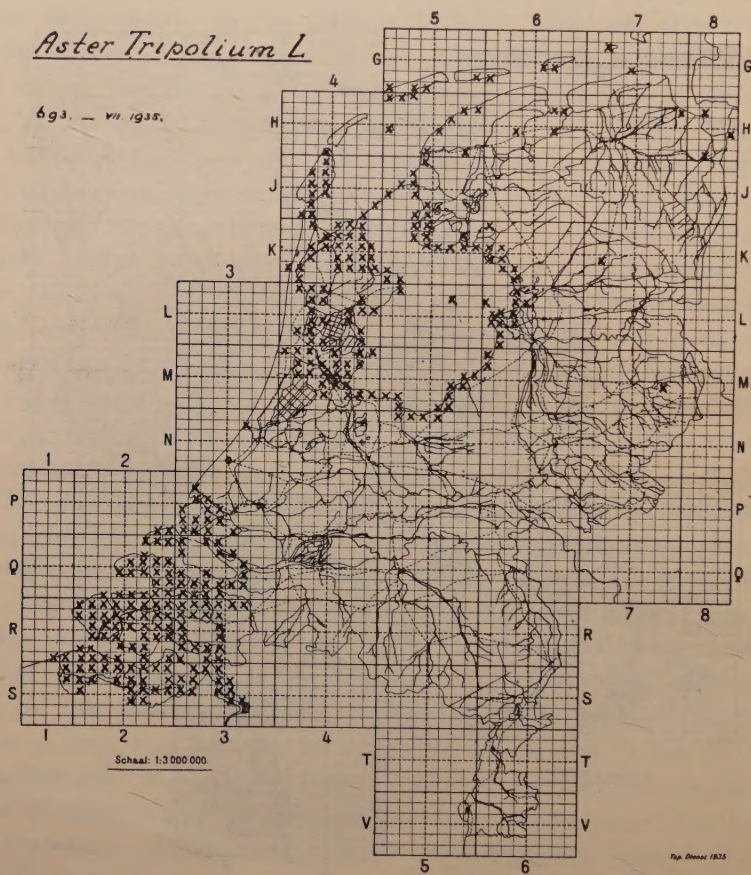
Artemisia maritima L.

749. - VII '35.



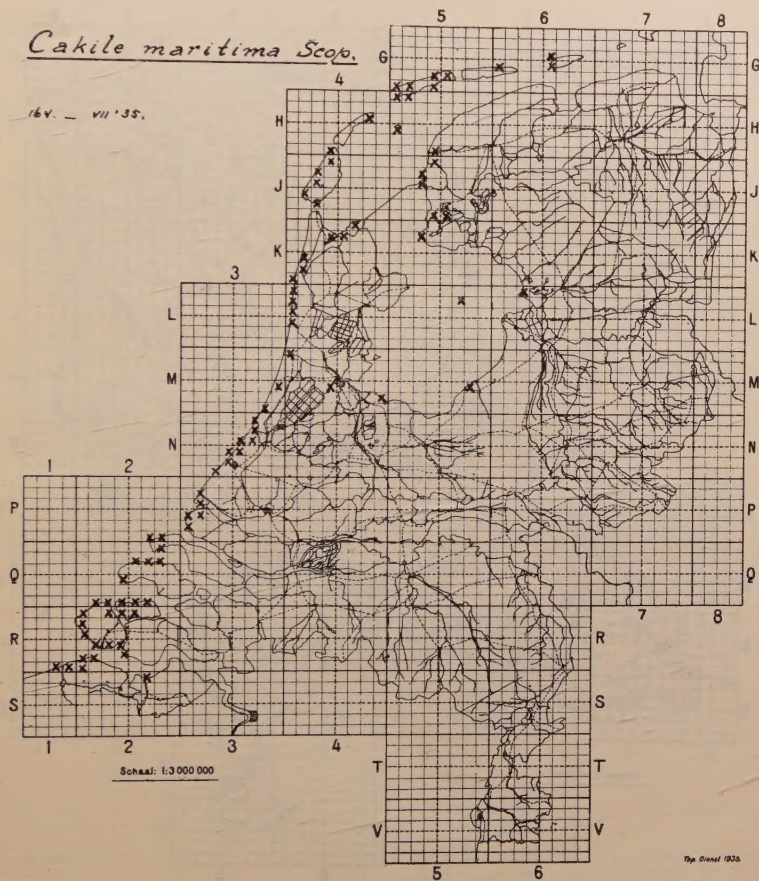
Aster Tripolium L

693. — VII 1935.



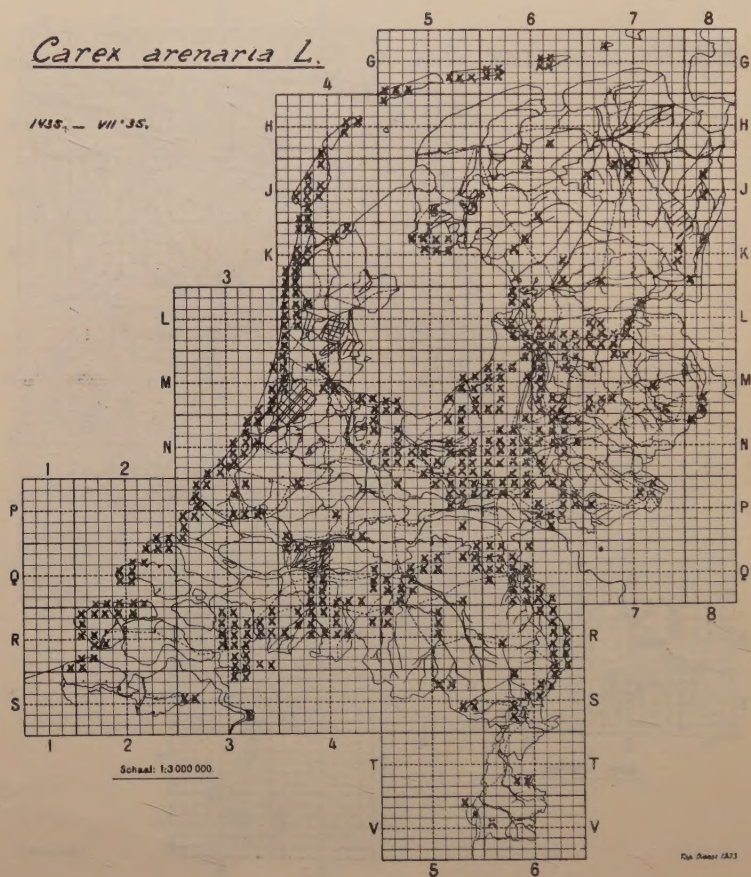
Cakile maritima Scop.

16 v. - VII '35.



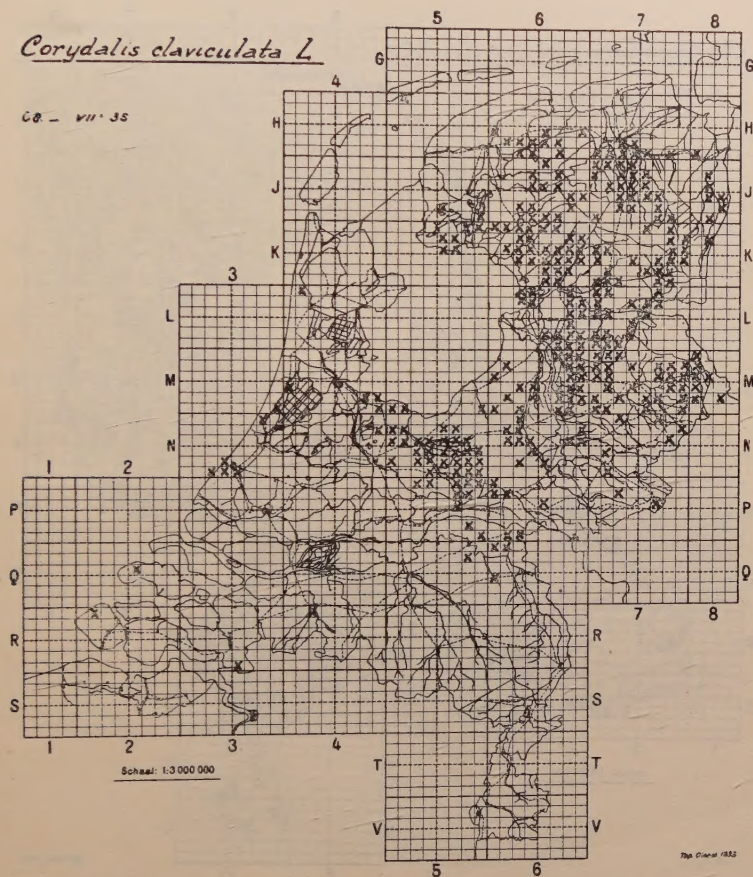
Carex arenaria L.

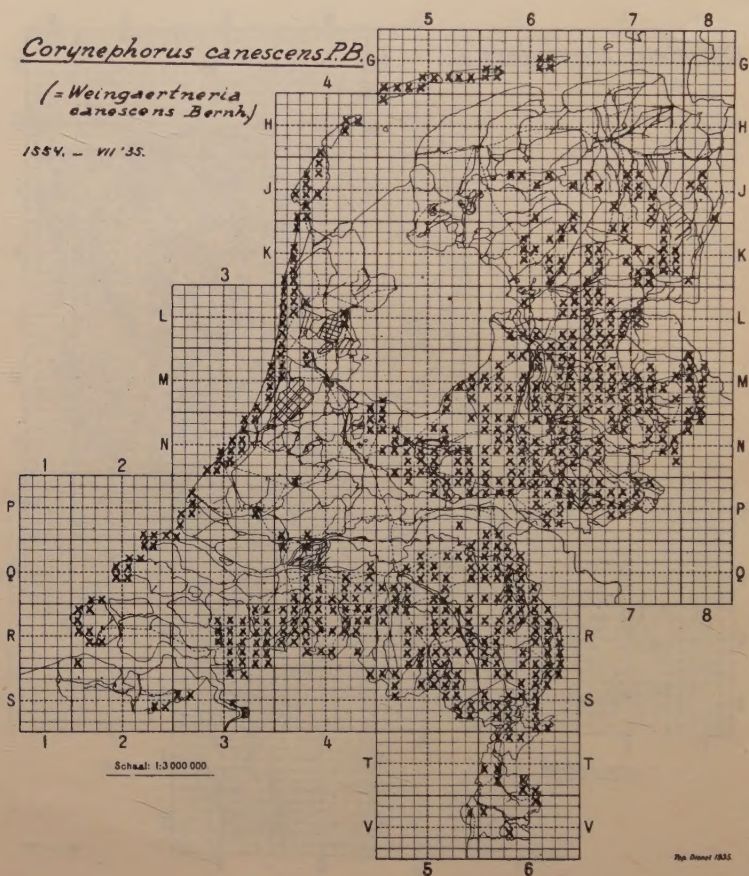
1435. — VII '35.



Corydalis claviculata L.

CG. - VII. 35





Erica Tetralix L.

873. — VII. 35.



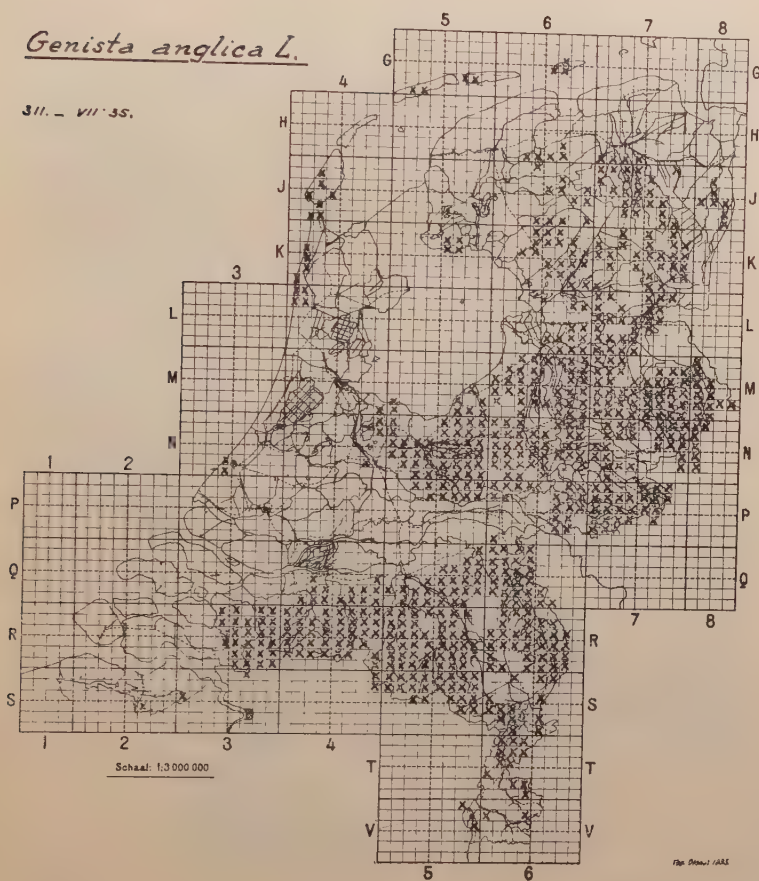
Eryngium maritimum L.

575. — VII '35.



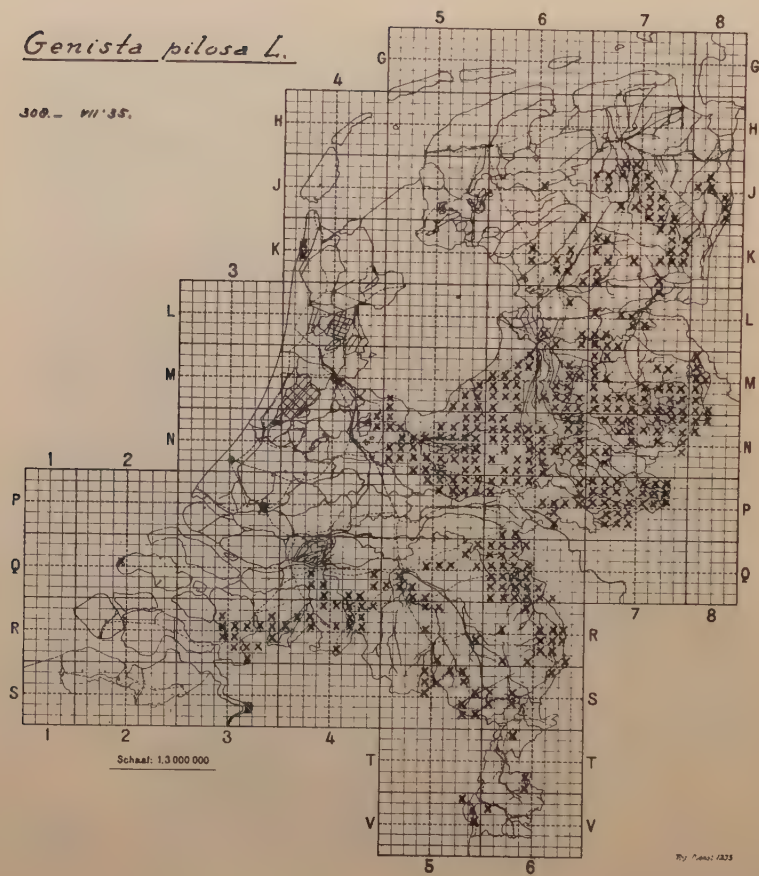
Genista anglica L.

311. — VII-SS.



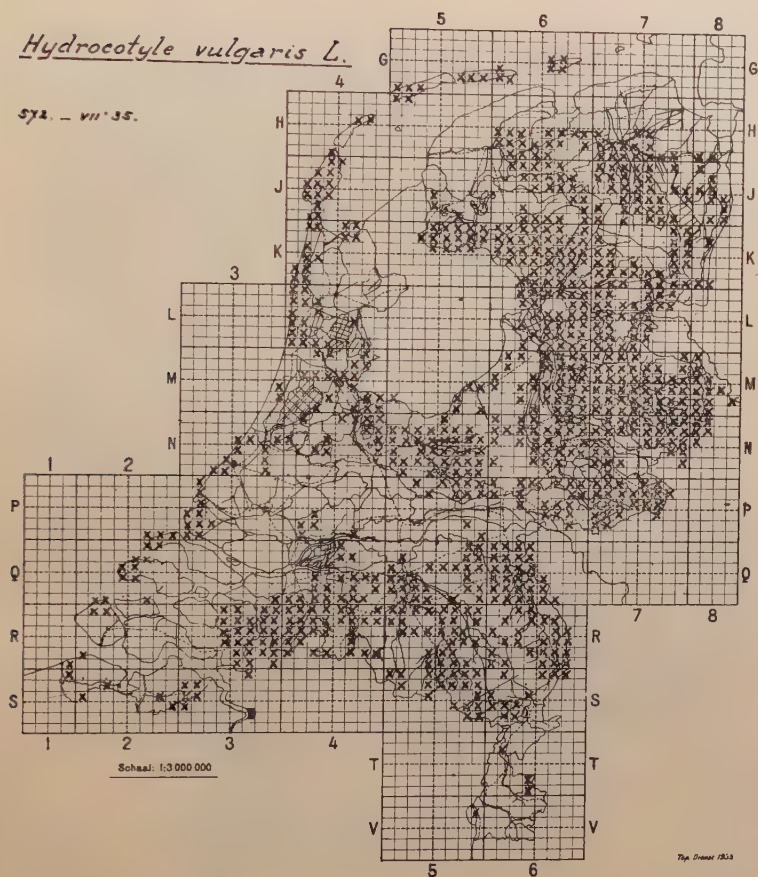
Genista pilosa L.

300. — VII '35.



Hydrocotyle vulgaris L.

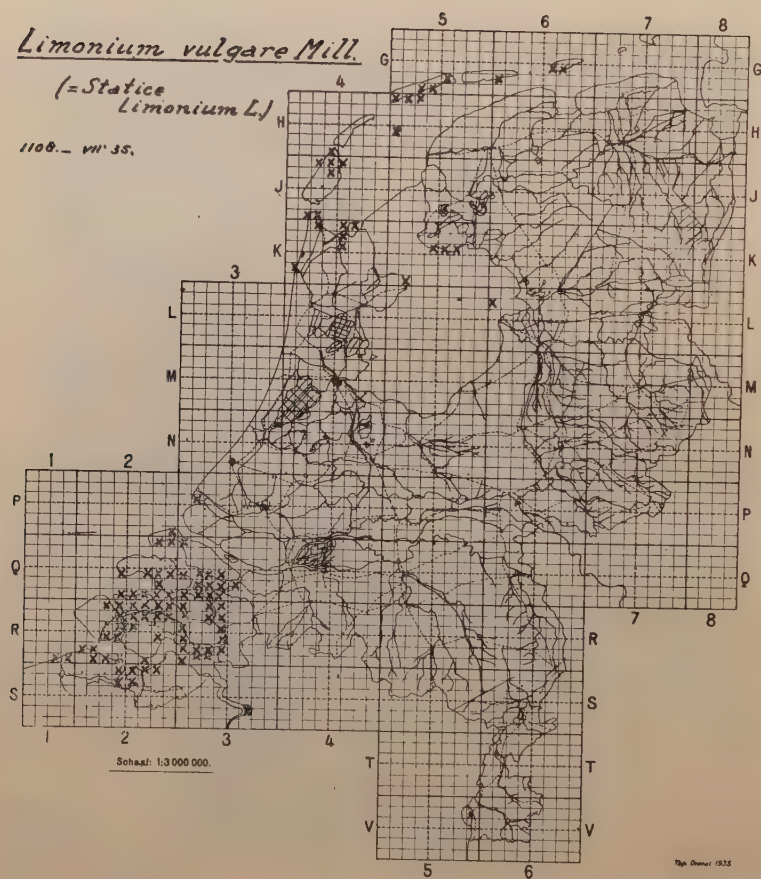
572. — VII. 35.



Limonium vulgare Mill.

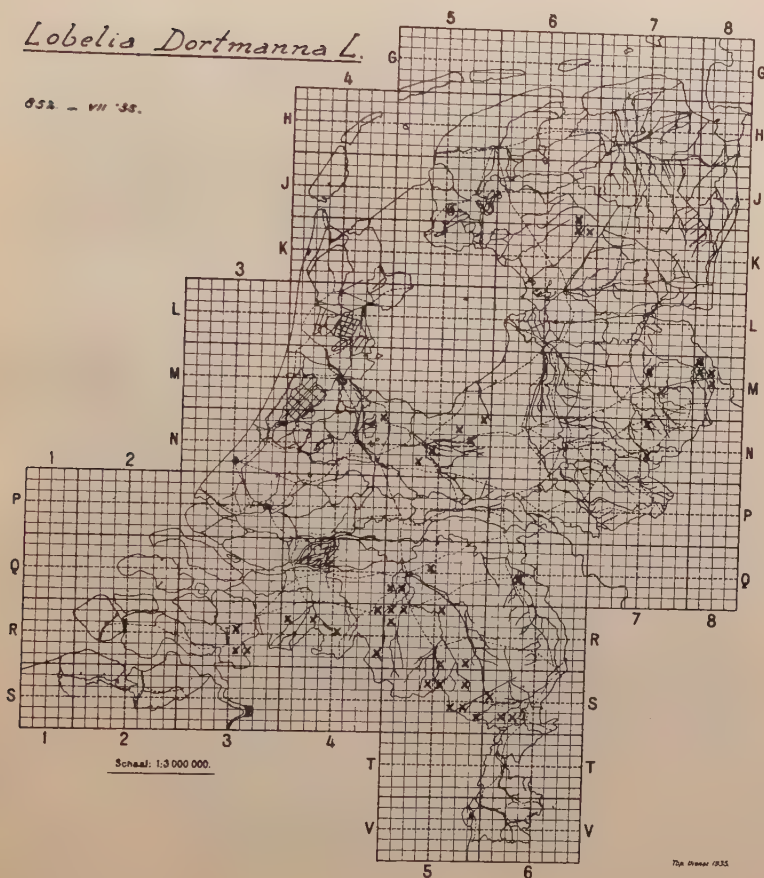
(= *Statice*
Limonium L.)

1108. — VII. 35.



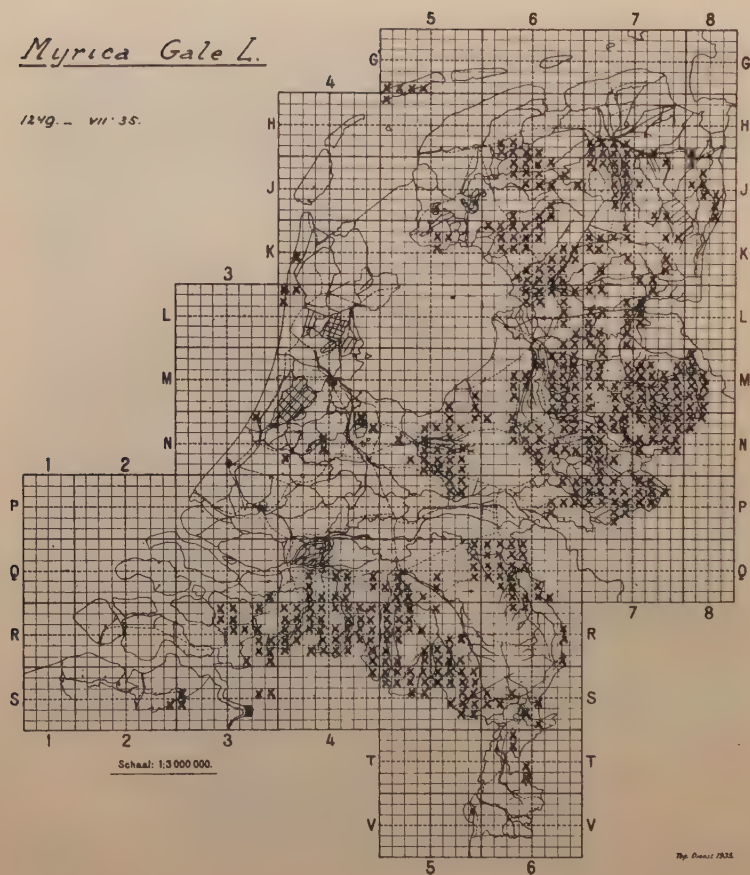
Lobelia Dortmanna L.

832 - VII '35.



Myrica Gale L.

1249. — VII. 35.



Rep. Brasi 1933

Narthecium ossifragum L.

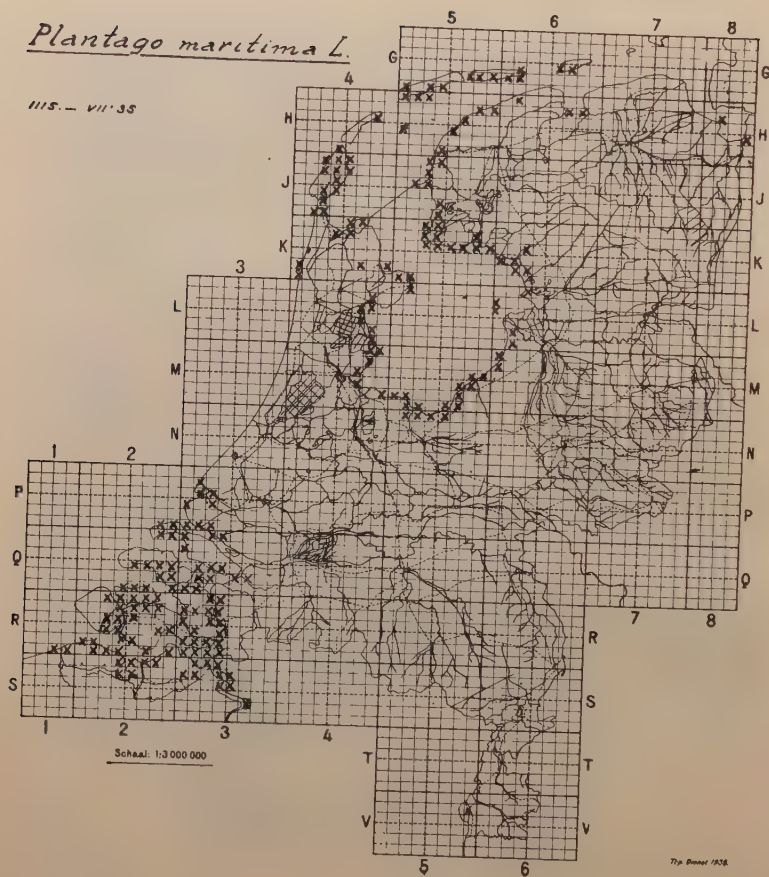
Huds.

1380. — VII. 38.



Plantago maritima L.

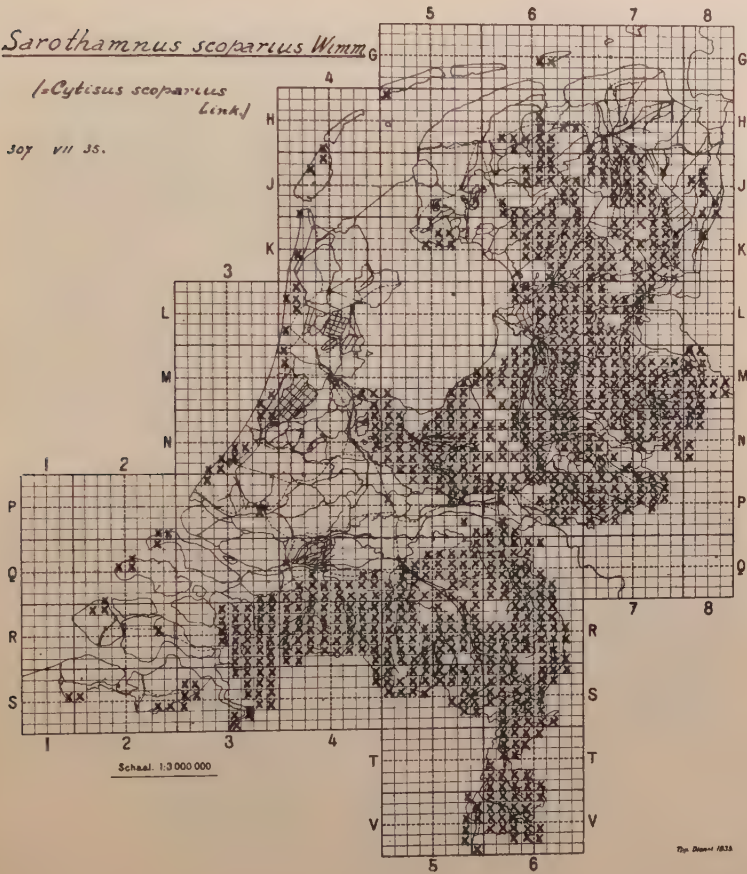
III.5. — VII.35

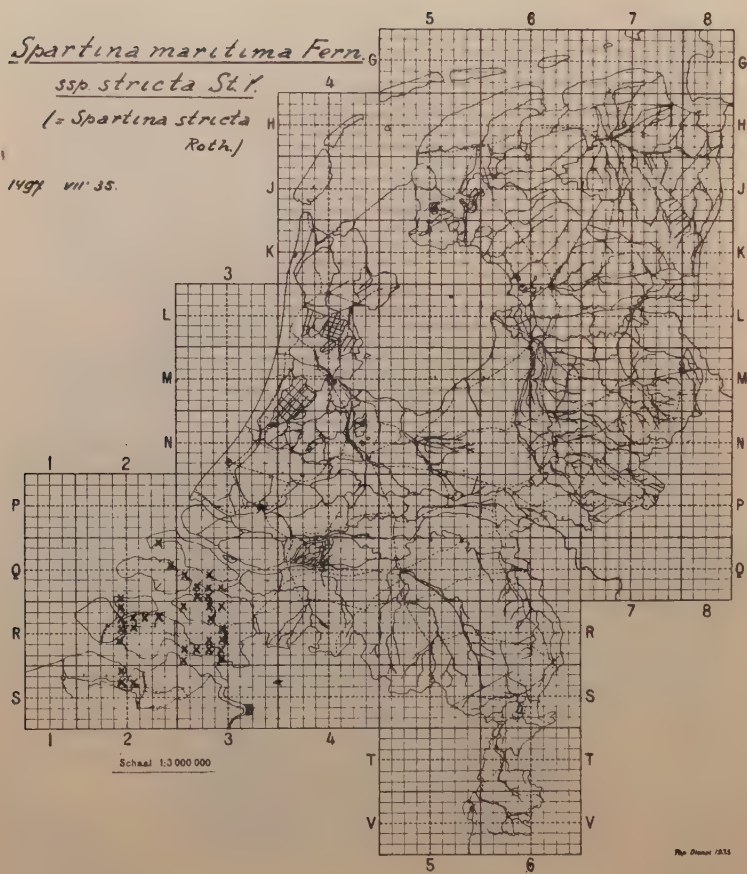


Sarothamnus scoparius Wimm.

(= *Cytisus scoparius* Link.)

307 VII 35.





Statice Armeria L.

var. maritima Hegi

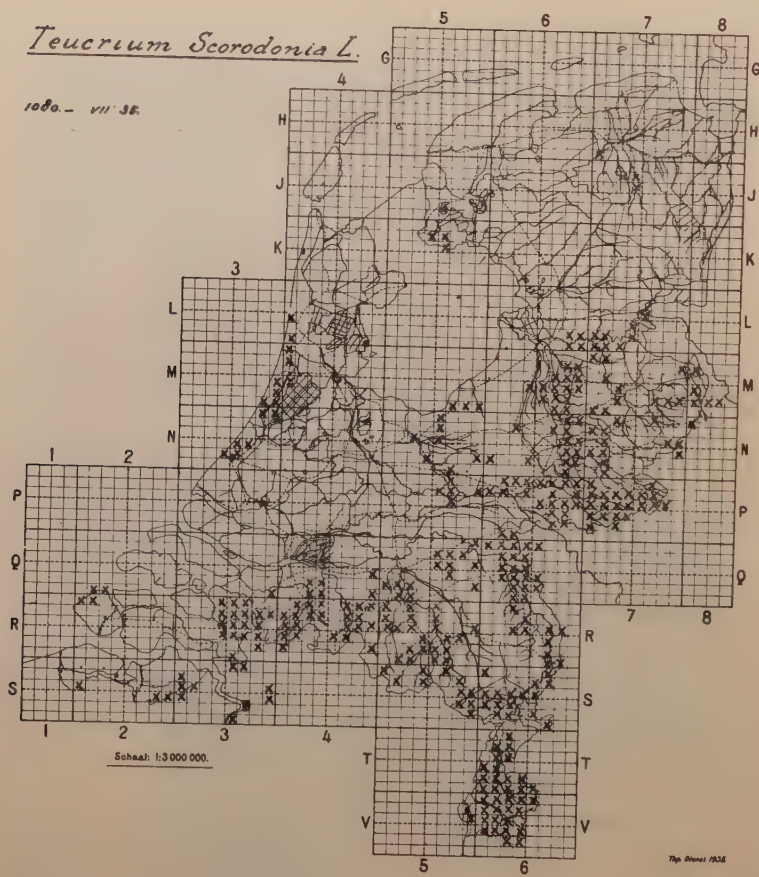
(= *Armeria maritima* H.
Willd.)

1107 VII 35.



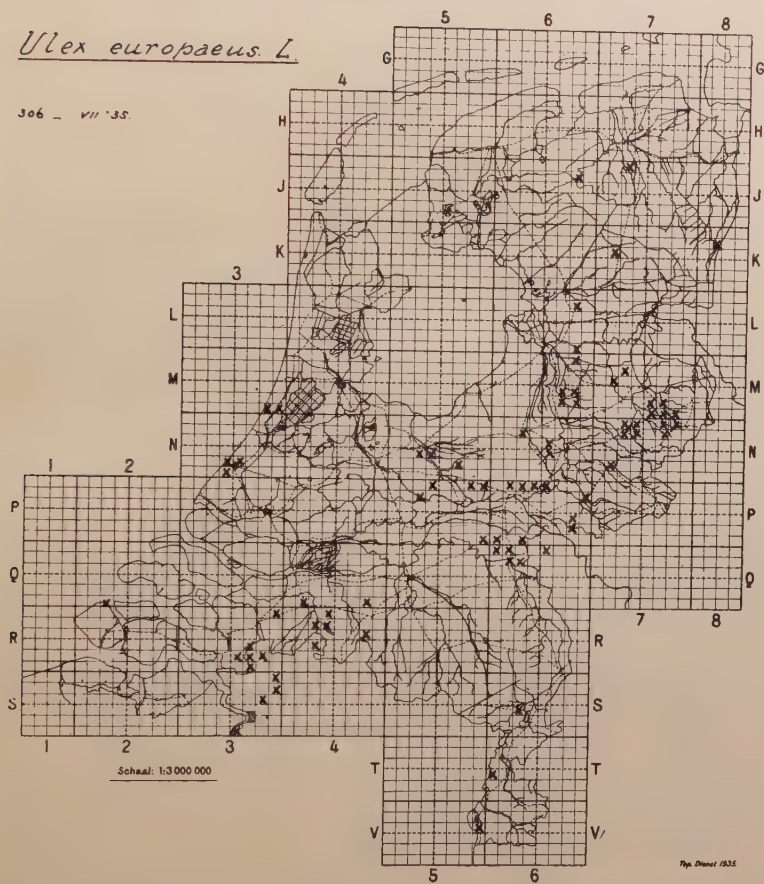
Teucrium Scorodonia L.

1880. — VII. SE.



Ulex europaeus L.

306 - VII '35.



EINE NEUE MORIOLA AUS JAVA.

von

E. BACHMANN

(Königsberg).

Mit 1 Tafel.

Unter allen Flechten unterscheidet sich die nur aus Norwegen bekannte Gattung *Moriola* dadurch, dass ihr Lager aus Goniocysten besteht, das sind kugel- oder länglichrunde oder unregelmässig gestaltete braune Behälter mit netzartiger Oberfläche, von denen braune, zylindrische oder schwach torulöse Hyphen entspringen und bis zur nächsten, manchmal weit entfernten Goniocyste hinkriechen. Auf diesem Wege, auch wenn sie zu mehreren nebeneinander herlaufen, vereinigen sie sich nie zu einer strauch-, oder blatt-, nicht einmal zu einer krustenformigen Lagermasse. Diese besteht ausschliesslich aus zerstreuten Goniocysten und den sie verbindenden Hyphen, die bei *Moriola pseudomyces* (Fig. 1—4) meist über morschem Holz, bei *Moriola sanguifica* über fremdem Algenlager ausgebreitet sind. Die braune Panzerkruste der Goniocysten entsteht dadurch, dass die dünnen zylindrischen Hyphenzellen unter Beibehaltung ihrer Dicke (2μ), stark in die Breite wachsen und die Gestalt von Kugelsektoren annehmen. Sie werden meistens nicht viel über 2μ dick, können aber bis 4μ dick werden, wenn sich die Aussenwand höckerartig verdickt. Näheres hierüber in meiner Osloer Arbeit¹⁾ und in den Berichten der Deutschen Botanischen Gesellschaft²⁾.

Die Früchte einer von Herrn P. GROENHART an mich übersandten Flechte (Fig. 5—7) sind von ihm in 3000 m Höhe auf Java gesammelt worden und entwickeln ihre sporenreichen Perithezien auf einem etwa 1 cm mächtigen, lockeren Lagermasse von fast rein schwarzer Färbung. Diese rührt von Holzkohle her, die in grösseren oder ganz kleinen Bruchstücken, selten in Form angekohlter Zweige zwischen und unter

¹⁾ EWALD BACHMANN, Die Moriolaceen. Saertryck av Nyt Magazin Naturvidenskaberne. Bd. 64. Mit Tafeln u. 13 Textabb.

²⁾ Berichte d. Dtsch. Botan. Gesellsch. Bd. 33, Berlin 1925.

den Goniocysten liegen. Die in den Goniocysten der tieferen Schichten enthaltenen Gonidien sind alle abgestorben und sehen jetzt braun aus. Nur in den Goniocysten der obersten Schicht sind die Gonidien noch jugendfrisch, sehen hellgrün aus und heben sich deutlich von der dunkelbraunen, 4μ dicken Kruste ab: eine einfache d.h. einkammerige Goniocyste mit 21.8μ Durchmesser, so dass auf den Innenraum fast 14μ Durchmesser kamen; in ihr hatten drei Gonidien Platz. Bei einer anderen, zusammengesetzten Goniocyste hatte sich an diametral gegenüberliegenden Punkten der Goniocyste je eine Gonidie angesetzt und war von der braunen Kruste auch noch umwachsen worden, so dass die beiden kleinen Endkammern je eine Gonidie enthielten, die Mittelkammer deren drei. Es kommen aber auch noch grössere zusammengesetzte Goniocysten vor, deren Mittelkammer 5 und mehr Gonidien enthält.

Die äusserste Goniocystenschicht enthält stellenweise auch Perithezien, meist kugelrunde, nach oben etwas zugespitzte, bräunlichwandige Behälter für die sporenerfüllten Schläuche. Die Perithezien haben 200μ Durchmesser oder wenig darüber und führen in breiten Schläuchen zweizellige, farblose Sporen, unterscheiden sich also wesentlich von der norwegischen *Moriola*. Die von GROENHART entdeckte javanische Flechte ist wegen ihrer Goniocysten eine echte *Moriola*, gehört aber in keine der beiden für Norwegen aufgestellten Sektionen: *Eu-* und *Paramoriola*, sondern erfordert die Aufstellung einer dritten Sektion, für die ich den Namen *Groenhartia* vorschlage. Die neue Flechte erhält also den Namen:

Gatt.: *Moriola* NORMAN

Sect.: *Groenhartia* BACHMANN

Art: *nigra* GROENHART

Beischrift von P. GROENHART (*Malang, Java*).

Die Entdeckung meiner *Moriola* war nur eine sehr zufällige und nicht weniger eine erfreuliche. Es war zu erwarten, dass jede lichenologische Forschung auf Java noch viel Neues und Interessantes ergeben würde, aber dass eine bis heute nur auf Norwegen beschränkte Gattung auch da zu finden sein würde, hatte ich nicht vermutet. Da die *Moriolaceae* mir völlig unbekannt waren, sandte ich Herrn Prof. BACHMANN ein kleines Thallusstück mit der Bitte meine Bestimmung mit

Bezug auf den Goniozysten kontrollieren zu wollen. Seine Befunde hat er in obenstehende Notiz niedergelegt und es erübrigt mir jetzt eine nähere Beschreibung der Flechte zu geben.

Die Stellen, wo die Flechte wächst, haben das Aussehen von Brandflecken zwischen dem Moos und leider habe ich sie auch dafür angesehen. Nur nachdem ich eine andere Flechte, welche ich auf und zusammen mit einer solchen Brandfleck eingesammelt hatte, studierte, entdeckte ich die winzigen Perithezien. Mit dem unbewaffneten Auge oder selbst bei Lupenvergrößerung ist ein deutlicher Thallus nicht zu unterscheiden. Nur hie und da sieht man auf einer grauschwarzen, kohligen oder mehr weniger verwitterten und ausgebleichten Unterlage braunschwarze Stellen, welche, wie eine mikroskopische Untersuchung ergibt, von dichter verwebten Thallushyphen herrühren. Wenn man die Stellen mit Wasser benetzt, wird das Wasser begierig aufgesogen, das Ganze wird dunkler aber ein deutlicheres Hervortreten des Thallus findet nicht statt. Auch Reagenzien geben kein Resultat.

Anatomisch stimmt der Bau des Thallus völlig mit BACHMANN's Beschreibung (Nyt Mag., Bd. 64, 1926) überein. Auch hier gehören die Algen der Unterlage zu verschiedenen Spezies und werden von den Thallushyphen mehr weniger berührt, jedoch scheint nur stets eine und derselbe Art in den Goniozysten eingehüllt zu werden. Im allgemeinen sind die Hyphen und Goniozysten in der oberen Schicht braun und werden nach unten zu allmählich farblos. Dasselbe gilt auch von den Perithezien, wobei die Wand von aussen nach innen von braunschwarz zu farblos übergeht. In KOH werden die braunen Hyphen schwarz und tritt in den Algen hie und da eine goldgelbe Reaktion auf.

Wesentlich verschieden sind die Schläuche und Sporen. Bei den norwegischen *Moriolaceae* sind die Schläuche walzlich und schmal keulenförmig und die Sporen braun und parallel mehrzellig bis mauerförmig. Bei der javanischen Art sind die Schläuche breit keulenförmig mit am Scheitel stark verdickter Wand, während die Sporen farblos, zweizellig¹⁾ und ovoid sind. Von den beiden Zellen ist die Scheitelzelle breiter und meistens grösser als die andere Zelle.

Auf Grund dieser Unterschiede konnte ich die javanische Art nicht bei einer der Untergattungen BACHMANN's einreihen und meinte ich die Aufstellung einer neuen Gattung vorschlagen zu müssen. Die Antwort hierauf ist bereits von BACHMANN gegeben (s. o. und Nyt Mag., Bd. 64, S. 199).

¹⁾ Nur in einem Ascus fand ich, ausser den normalen zweizelligen, eine 4-zellige Spore.

Moriola nigra, nova species (Fig. 5—7).

Thallus gonioecystialis ex hyphis fuscis vel decoloribus et gonioecystibus formatus. K—, Ca—, KCa—. Hyphae thalli laxae contextae, leptodermaticeae, 5—6 μ latae, septatae (cellulis usque ad 22 μ longis), increbre ramosae et ramos directos emittentes, in parte thalli superiore fuscae, in parte inferiore decolores. Gonioecystia globosa, in parte thalli exteriori in capsulis fuscis omnino clausis, in KOH nigris, p.p. libera, p.p. conglutinata; in parte thalli inferiori in capsulis retiformibus decoloribusque, minus conspicua, conglomerata; diam. 20—80 μ . Cellulae capsularum diversiformes, \pm 3 μ altae, usque ad \pm 7.5 μ longae, membranis tenuibus, sed membrana exterior convexa crassior est quam membrana interior concava. Gonidia gonioecystium globosa, laete viridia, cyanophyceae, parte supra substratum algis diversarum specierum suffulta.

Apothecia pyrenocarpica, numerosa, dispersa vel approximata, sessilia, globosa vel leviter depresso-globosa, rarius ad apicem attenuata, ad basin constricta, a thallo omnino libera, opaca vel subnitida, nigra, 0.2—0.3 mm lata, poro terminali tenuissimo pertusa. Excipulum integrum, extus nigrum vel fusco-nigrum, intus decoloratum, ex hyphis parallelis, septatis, pseudoparenchymate connectis, fusco-nigris vel decoloribus formatum. Hymenium decolor, pellucidum, J + lutescens, K + lutescens. Paraphyses in gelatinam diffusae. Asci late clavati, superne rotundati, membrana bene incrassata, 6- (8-?) spori. Sporae

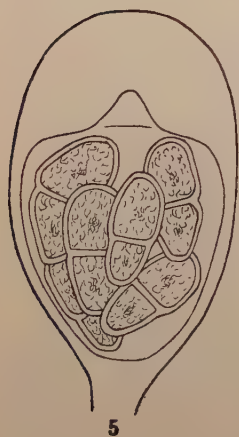
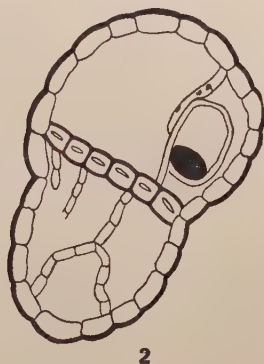
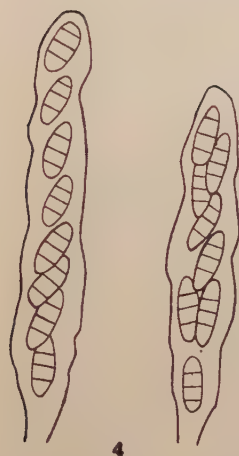
Figurenerklärung.

Fig. 1-3. Goniocysten von *Moriola pseudomyces* NORM.

1. Aussenansicht einer jugendlichen, einkammerigen Goniocyste. Durchmesser 12.3 μ ;
2. Querschnitt einer abgestorbenen, zweikammerigen Goniocyste. Nur eine der beiden Kammern enthält noch ein schon mehr als halb entleertes Gonidium. Durchm. $32.5 \times 25 \mu$;
3. Querschnitt einer fast halben, jugendlichen Goniocyste mit etwa 40 jugendfrischen Gonidien und vielen zarten Innenhyphen. Durchm. 73.5 μ (BACHMANN, orig.).

Fig. 4. Zwei Schläuche mit 1- und 2-reihiger Anordnung der Sporen von *M. pseudomyces* NORM. (nach BACHMANN).

Fig. 5-7. *Moriola nigra* P. GROENH. — 5. Schlauch, 6. Spore, 7. Partie des Lagers mit Goniocysten (G), Hyphen (H), Substrat (S) und Perithezium (P). (GROENHART, original).



in ascis tri- vel pluriseriales, hyalinae, uniseptatae, ad septum interdum leviter constrictae, ad apices rotundatae, rectae vel leviter curvulae, ovoideae, $13-19 \times 48-50 \mu$.

Java orientalis, in summo montis Welirang, ± 3000 m s.m., apud ruinas prope viam ad Kawah Ploepoh, supra algas inter muscos ad terram. Leg. P. GROENHART, Typus in herb. meo, no. 798.

ARCHBOLDIA, A NEW VERBENACEOUS GENUS FROM NEW GUINEA

by

EVA BEER and H. J. LAM.

Archboldia, nov. gen. — *Frutices; folia* opposita; *inflorescentiae* terminales, paniculato-corymbosae, cymis compositae; *calyx* plus minusve patens, infundibuliformis, 5-lobatus; *corolla* exserta, ventricoso-cylindrica, utrinque glabra, actinomorpha, breviter 5-lobata; *stamina* 4 alternipetalia, introrsa, dorsifixa haud exserta, monodynamia, corollae paulo sub fauce inserta, breviter filamentosa; *ovarium* 4-sulcatum, bicarpellatum, imperfecte 4-loculatum, ovula 4 anatropa placentis basi-parietalibus inflexis affixa; *stylus* haud exsertus, stigmatibus subulato; cetera desunt.

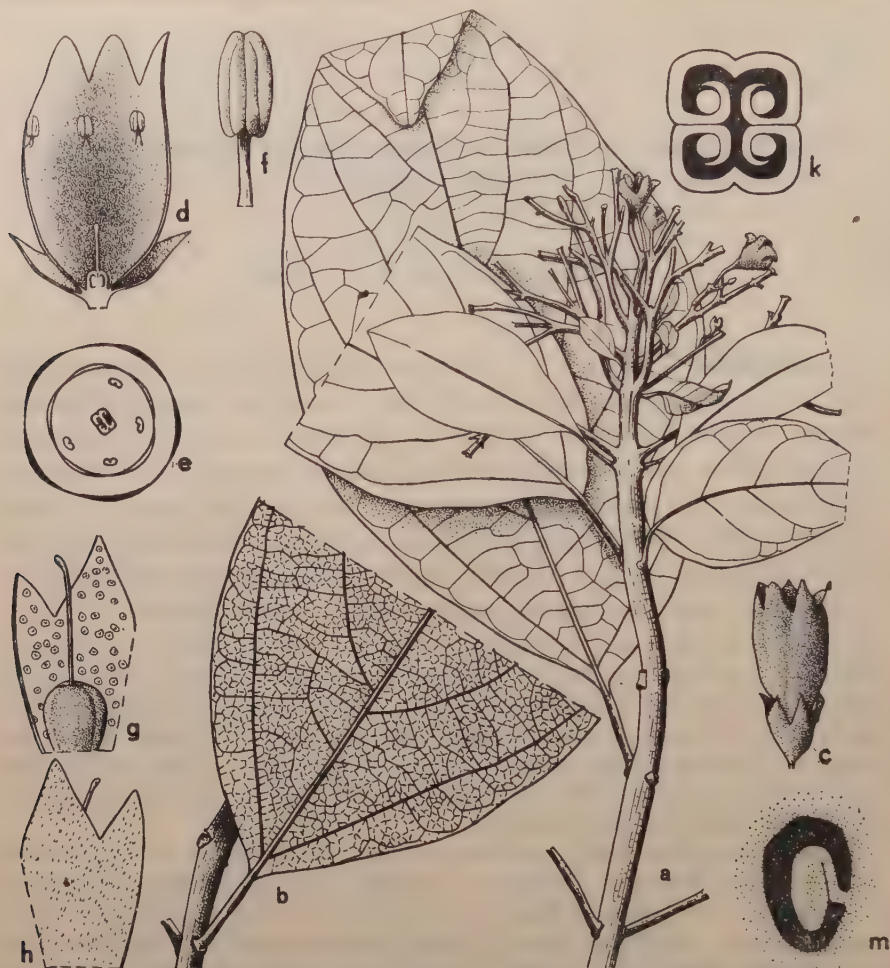
Though the material is very scanty and not very well preserved, we may suppose with some probability that this is the representative of a new genus. It cannot be combined with any Verbenaceous genus thusfar known from Malaysia, New Guinea, Australia or Polynesia, being particularly distinguished by its peculiarly glabrous, inflate and actinomorphous corolla and its monodynamous and very short stamens. These features remind somewhat of certain Ericaceae, hence the specific name, chosen for the only species known at the time.

As the ripe fruit and the seed are unknown, it is difficult to say something definite on the taxonomic relations of the genus. It could possibly be placed in the subsection *Chloanthoideae-Physopsidae*, which is entirely of Australian distribution; however, *Archboldia* misses the woolly indumentum which is so characteristic for this group and the general habit reminds one strongly of *Faradaya* (*Viticoideae-Clerodendreae*); I would provisionally consider it as an ally to the last-named group.

The genus is named in honour of Mr. RICHARD ARCHBOLD, leader of the 1933—34 New Guinea Expedition of the American Museum of Natural History.

One species in New Guinea:

A. ericoides, nov. spec. — *Frutex* glabra vel subglabra; *ramuli* subquadrangulares; *folia* opposita, decussata, papyracea, ovata, basi late acuta, apice obtuse acuminata, margine integra, 14—17 cm longa, 7—8 cm lata, supra cum petiolo 1—2 cm longo glabra, subtus minute sparseque pubescentia; costa media i.s. supra vix, subtus valde prominens; nervi secundarii 5—7, distantes, basales oppositi, recti, fere ad folii dimidium adscendentes, ceteri curvati, omnes distincte prominuli; nervi tertiarii transversii, minutiores reticulati, subtus conspicui; *inflorescentia*



Archboldia ericoides, nov. gen., nov. spec. — a. leaves and inflorescences; b. part of leaf, showing venation; c. flower; d. id., longitudinal section; e. id., diagram; f. anther; g. calyx inside, with ovary and style; h. calyx outside; k. cross section of ovary; m. position of ovulum at longitudinal section. — C. MULDER del.

basi foliosa terminalis, e pedunculo brevi late corymbosa, circ. 6—8 cm longa et lata, minutissime pubescens vel subglabra, cymae pauciflorae decussatae, bractae caducae; *flores* majuseuli, pedicelli 0.1—0.2 cm longi, cum calyce extus sparse adpresse minuteque pubescentes; *calyx* extus sparse minute pilosus, intus glaber, glandulis minutis aureofulvis suffultus, 0.6—0.7 cm longus, lobi deltoidei 0.3 cm longi, acuti; *corolla* utrinque glabra subcarnosa circ. 2 cm longa, tubo subinflato 0.7—0.8 cm diam., lobi obtusi circ. 0.4 cm longi; stamina glabra, antherae et filamenta circ. 0.15—0.2 cm longi; ovarium glabrum, minutum; stylus glaber, brevis.



Amorphophallus plicatus, n. sp.

New Guinea: Papua, Western Division, Wuroi, Oriomo River; edge of small swamp in savannah forest, 30 m in alt. (L. J. BRASS, no. 6025, *type specimen*). Shrub, about 1 m, one example, with a few erect branches from enlarged stock; branchlets, petioles and underside of midribs purple; fruits very young red, in Jan.—March 1934.

A NEW AMORPHOPHALLUS FROM CELEBES

by

MARIE B. BOK & H. J. LAM

(*Leiden*).

Amorphophallus plicatus, nov. spec.

Tuber et folium non videmus; unam spadiceam glabram tantum videmus. Cataphylla 3 oblongo-lanceolata, 33, 19, 17 cm longa, 6.7, 2.8, 4.5 cm lata, apice obtusa, duo ut apparet basi, unum (brevissimum) pedunculi apice affixa. Pedunculus 4.5 cm longus et i. v. 2.1 cm (i. s. 1.9 cm) crassus. Spatha 25 cm longa, late campanulata, basi convoluta, margine laciniata, marginem versus valde plicata, intus basin versus purpurea (?) et minute papillosa, supra pallidior, laciniae inaequales usque ad 9 cm longae. Spadix quam spatha duplo longior, 45 cm longa; inflorescentia feminea cylindrica, circ. 5.5 cm longa, 2.5—2.8 cm crassa; mascula arcte contigua basi paulo constricta, circ. 5 cm longa, 2—2.5 cm crassa; appendix 36 cm longa, anguste cylindrica, sensim attenuata; flores masculini plus quam flores feminei congesti. Ovarium globosum sessile, 3-loculare, apice in stylum attenuatum; stylus ovario subaequilongus vel (paulo) longior; stigma non vel obscure 2-lobata. Stamen solitarium circ. 1 mm longum, 2 mm latum; antherae adnatae apice 2 poris dehiscentes.

Celebes: N. Celebes, Bolaang-Mongondou, Modajag, 750 m in alt., in forest (leg. W. KAUDERN 243, Oct. 1917, *type spec.* in Herb. Stockholm).

Remarks: As two of the cataphylls were detached, the length of the peduncle is not quite certain; however, the peduncle is somewhat dilated at base, which suggests an attachment to the tuber. The third (smallest) cataphyll is inserted immediately below the spatha (cf. *photograph*, right hand side).

Related to *A. Rivieri* DURIEU from Cochinchina, cf. ENGLER in *Pflanzenreich* IV, 23 C, 1911, 85 and to *A. Merrillii* KRAUSE, from the Philippines, in *Notizbl. Bot. Gart. Berl.* 5 No. 49, 1912, 266, but distinguished from these two by the short peduncle and the deeply lacinate and plicate spatha.

MISCELLANEOUS NOTES ON LORANTHACEAE 9—15.

(Nrs. 1—8 in Recueil Trav. Bot. Néerl. 31, p. 223—236 and 751—760, 1934)

by

B. H. DANSER

(Botanical Laboratory of the University, Groningen, Holland)

With 2 figures.

9. *Amylothea micranthes* Dans., n. sp.

Ramulus c. 2 mm crassus, apice paulum incrassatus, ad 5 mm dilatatus, 2 folia et 2 inflorescentias ferens, superficie tenuiter ferrugineo furfuraceus. Folia opposita; petiolus ut costae pars basalis ferrugineo furfuraceus, c. 8 mm longus, basi tereti c. 1.5 mm crassus, laminam versus supra applanatus; lamina oblonga, 6.5—7 cm longa, 3 cm lata, sub basi rotundata abrupte in petiolum contracta, apice rotundata, faciebus vix diversis, costa basin versus facie inferiore paulo distinctiore quam facie superiore, ceterum utrinque opaca, costa nervisque crassioribus paulum prominentibus distinctis, venis indistinctis sed visibilibus. Inflorescentia racemus triadum decussatarum floribus omnibus sessilibus; axis 3—3.5 cm longus, teres, nodis paulum applanatis, a basi c. 1 mm crassa apicem versus ad c. 0.5 mm attenuatus, in c. 6 mm inferioribus nudus, ceterum 6—7 paria triadum decussata ferens; pedicelli triadum inferiorum c. 1 mm longi, superiorum gradatim ad 0.5 mm decrescetes, 0.75—0.5 mm crassi, teretes; bractee bracteolaeque suborbiculares, 1—1.25 mm longae, rotundatae vel breviter acuminatae. Calycis tubus subcylindricus, 2—2.5 mm longus, 1 mm latus, limbus erectus 0.5—0.75 mm longus, margine plerumque irregulariter laceratus et patens. Corolla statu alabastri adulti 6—7 mm longa, subcylindrica, in 2 mm superioribus paulum incrassata, apice obtusa, postea usque ad basin divisa in petala 6 sublinearia, 7—8 mm longa, c. 0.4 mm lata, parte superiore c. 2 mm longa reflexa paulo latiore apice obtusiuscula crassiuscula. Filamenti pars libera 0.25—0.5 mm longa; anthera c. 1.25 mm longa, acutiuscula. Stylus 6—7 mm longus, 6-angulus, a basi ad apicem paulum attenuatus; stigma styli apice paulo crassius, rotundatum. Cetera ignota.

Island Biak (north of New Guinea), near Bosnèk, on the coast, on coral limestone covered with terra rossa, Sept. 2, 1915,

FEUILLETAU DE BRUYN 369 (B), with the remark „shrub 3 m high, with a stem 10 cm in diameter, flower light-green”, bearing, at least partly, on the host tree.

Description after a single twig extremity bearing 2 leaves and 2 complete flowering inflorescences, found by VALETON among *Rubiaceae*. It is strikingly different from all *Amylothea* species known, by extremely small flowers, and approaching in this respect only the Philippine *A. tenuis* and *A. apodotrias* DANSER [Philipp. Journ. Sc., 58, 1 (1935) p. 9 et 8] with corollas respectively 13 and 11 mm long.

10. New delimitation proposed for some genera of *Elytranthinae*.

The examination of some *Elytranthe* species of the Asiatic continent convinced me of the necessity to alter the limits of *Elytranthe* as accepted by me up to the present (Verh. Kon. Akad. Wetensch., Amsterd., afd. Natuurk., sect. 2, 29, 6, p. 4, 50). In this genus I distinguished (l. c. p. 15—16) 3 subgenera that perhaps deserved generic distinction, viz. *Coeloma*, *Pseudocephala*, and *Blumella*, and in *Lepidaria* (ibidem) 2 subgenera, viz. *Strobilaria* and *Lepidella*. Now *Blumella* proved to be only superficially differing, and therefore not to be separable, from *Macrosolen*, and *Pseudocephala* not from *Lepidaria* subg. *Strobilaria*, so that for *Elytranthe* there only remain the species formerly put into the subg. *Coeloma*. Moreover these so-called species of *Elytranthe* all proved to be synonymous, in spite of slight differences, and the genus *Elytranthe* thus becomes a monotypic genus. In transferring *Elytranthe arnottiana* to *Lepidaria* I prefer to divide, at the same occasion, the latter genus into *Lepidaria, sensu strictiore*, and *Lepidella*.

The following scheme may elucidate this alteration.

Old names.	Subgenera.	New names.
<i>Macrosolen</i>	Blumella	<i>Macrosolen</i>
<i>Elytranthe</i>	Coeloma	<i>Elytranthe</i>
	Pseudocephala	
	Strobilaria	<i>Lepidaria</i>
<i>Lepidaria</i>	Lepidella	<i>Lepidella</i>

The system of the *Elytranthinae*, now necessary, is given in the following scheme, including also the alterations made necessary by

the distinction of the genus *Thaumasianthes*, and the correction of *Cyne* and *Lepeostegeres* (Rec. trav. bot. néerl., 30, p. 464—474).

3a Flowers in triads, these triads united into larger inflorescences.

4a Inflorescence a raceme, a spike, or an umbel of triads.

5a Anthers basifixed **Amylotheca**

5b Anthers dorsifixed (immobile) **Loxanthera**

4b Inflorescence a head-like umbel of triads with an involucre . . . **Lampas**

4c Inflorescence a simple head.

5a Head with an involucre of decussate bracts **Lepeostegeres**

5b Head with cucullate involucre of one piece **Cyne**

4d Inflorescence a composite head, all bracts of which bear 3 flowers or the interior ones less, all flowers with one bract and 2 bracteoles **Thaumasianthes**

3b Flowers not in triads, single in the inflorescences.

4a Corolla choripetalous **Peraxilla**

4b Corolla sympetalous.

5a Each flower with 3 bracts (1 bract and 2 bracteoles).

6a Inflorescence a raceme, a spike, or an umbel.

7a Corolla without thin-walled, enlarged part at the base.

8a Flower 6-merous **Macrosolen**

8b Flower 4-merous **Trilepidea**

7b Corolla at the base with a thin-walled, enlarged part . . . **Elytranthe**

6b Inflorescence a head-like, condensed, sessile spike, with imbricate bracts, but with prolonged axis, usually more than 4-flowered . . . **Lepidaria**

6c Inflorescence a real head, with flat receptacle, 4- or less-flowered . **Lepidella**

5b Each flower with a single bract.

6a Flowers in racemes. Bracts deciduous **Alepis**

6b Flowers in umbels. Bracts persistent **Lysiana**

The nomenclatorial consequences of these alterations of the genus-limits are the following.

The species placed hitherto in *Macrosolen* remain in this genus. To these are added 3 species, formerly placed into *Elytranthe* and there making out the section *Blumella*. They are:

Macrosolen capitellatus (WIGHT & ARN.) DANS., nov. comb.; *Loranthus capitellatus* WIGHT & ARN., Prodr. Fl. Pen. Ind. Or., p. 382 (1834) &c.

This can hardly be taken apart from the following as a species.

Macrosolen parasiticus (LINN.) DANS., nov. comb.; *Lonicera parasitica* LINN., Sp. pl., ed. 1, 1, p. 175 (1753) &c. (cfr. l.c. p. 52), also: *Tolypanthus loniceroides* ETTINGSH., Denkschr. Akad. Wissensch. Wien, Math.-Naturwiss. Cl., 32, p. 53 (1872).

Macrosolen psilanthus (HOOK.F.) DANS., nov. comb.; *Loranthus psilanthus* HOOK.F., Fl. Br. Ind., 5, p. 222 (1886) &c.

In the genus *Elytranthe* there remains only one species, viz.:

Elytranthe albidia (BL.) BLUME, for the synonyms of which cfr.

l. c. p. 52, to which also the synonyms of *E. Colletii* (l. c. p. 51), *E. drancensis* (l. c. p. 51), *E. Henryi* (l. c. p. 51), and *E. Petelotii* (l. c. p. 52) must be added.

In the genus *Lepidaria* we keep *L. bicarinata* VAN TIEGHEM, *L. oviceps* DANS., and *L. pulchella* DANS., whereas the following species must be transferred to it:

Lepidaria arnottiana (KORTH.) DANS., nov. comb.; *Loranthus arnottianus* KORTH., Verh. Batav. Genootsch., 17, p. 284 (1839) &c. (cfr. l. c. p. 50).

Into the genus *Lepidella* must enter the following species, kept by me in *Lepidaria* up to the present.

Lepidella biflora (VAN TIEGH.) DANS., nov. comb.; *Lepidaria biflora* VAN TIEGH., Bull. Soc. Bot. Fr., 42, p. 441 (1895) &c. (cfr. l. c. p. 63).

Lepidella Forbesii (KING) DANS., nov. comb.; *Loranthus Forbesii* KING, Journ. As. Soc. Beng., 65, 2, p. 100 (1887) &c. (cfr. l. c. p. 63).

Lepidella Kingii (KING) DANS., nov. comb.; *Loranthus Kingii* KING, Journ. As. Soc. Beng., 65, 2, p. 99 (1887) &c. (cfr. l. c. p. 64).

Lepidella malaiana (DANS.) DANS., nov. comb.; *Lepidaria malaiana* DANS., Bull. Jard. Bot. Buitenz., ser. 3, 11, p. 314 (1931) (cfr. l. c. p. 64).

Lepidella quadriflora (VAN TIEGH.) DANS., nov. comb.; *Lepidaria quadriflora* VAN TIEGH., Bull. Soc. Bot. Fr., 42, p. 441 (1895) &c. (cfr. l. c. p. 64).

Lepidella sabaënsis (STAPF) VAN TIEGH., &c. (cfr. l. c. p. 64).

Lepidella tetrantha (MERR.) DANS., nov. comb.; *Loranthus tetranthus* MERR., Phil. Journ. Sc., bot., 7, p. 79 (1912) &c. (cfr. l. c. p. 64).

Lepidella vaginata (VAN TIEGH.) VAN TIEGH., &c. (cfr. l. c. p. 64).

Lepidella Williamsii (MERR.) DANS., nov. comb.; *Loranthus Williamsii* MERR., Phil. Journ. Sc., bot., 4, p. 148 (1909) &c. (cfr. l. c. p. 64).

11. The Loranthaceae of Dr. Kaudern's Celebes Expedition.

Through the courtesy of the Direction of the State Herbarium at Leiden, I had the opportunity to revise a collection of Loranthaceae, collected by Dr. KAUDERN in Celebes, very small but so remarkable, that it seems to deserve a short publication. The 5 numbers it contains belong to as many species, of which one seems to be new to science, whereas one is very rare up to the present, and 2 are new for Celebes.

Macrosolen coriaceus DANSER, n. sp. — Omnis glabra. Stolonibus longis haustoriis crassis oblongis plantae nutrici affixa. Rami ramulique

teretes, internodiis foliiferis 2.5—5 mm crassis, nodis incrassatis applanatis ad duplo latoribus. Folia opposita vel subopposita vel etiam sparsa; petiolus basi subteres, laminam versus supra applanatus semiteres, 3—10 mm longus, 1.5—2.5 mm crassus; lamina ovata vel subelliptica, 6—12 cm longa, 2.5—7 cm lata, basi rotundata vel subeuneata, apice obtusa, crasse coriacea, penninervis nervis lateralibus incurvis, facie superiore lucidula nervis paulum prominentibus, facie inferiore opaca costa valde prominente nervis lateralibus subdistinctis. Inflorescentiae gregatim in axillis foliorum et numerosiores in axillis defoliatis, racemi paribus florum 2 vel 3 congestis; pedunculus ad 6 mm longus 1.5 mm crassus, apice dilatatus; axis florifer brevissimus; pedicelli 0.5—1.5 mm longi; bracteae bracteolaeque ovato-triangulares, ad 1 mm longae, obtusae vel subacutae. Calyx cylindraceus, 2.5—3 mm longus, 1.25—1.5 mm latus, limbo brevi integro erecto; corolla statu alabastri adulti ad 12 mm longa, in dimidia parte inferiore inflata, paulum sub medio alis angustis 6, parte dimida superiore in clavam obtusissimam ad 2 mm crassam 6-carinatam incrassata, aperta obscure rubra. Stylus c. 0.75 mm supra basin articulatus, rostrum breve 6-angulum pyramidatum in fructu relinquens. Flos apertus et fructus ignoti.

Island Banggai, Febr. 1920, W. KAUDERN 507 (L), parasite upon a pomelmoose tree, flowers dark red.

Dendrophthoë pauciflora DANS., in Bull. Jard. Bot. Buitenz., ser. 3, 11, p. 417, ic. 21, 1-n (1931).

East Celebes, Loewoek, on limestone rocks near the sea-shore, Jan. 1920, W. KAUDERN 433 (L) small tree.

This species was described by me after rather incomplete materials, collected by RIEDEL and FORSTEN near Gorontalo and Kotaboena, and not bearing open flowers. The present materials, from Loewoek, though consisting of only few twigs, bear open flowers and so afford a well-come completion of the description. To the original description may be added the following: Corolla aperta 13—15 mm longa, in 0.4 partibus inferioribus inflata ad 3.5 mm lata, 5-fida, tubo c. 4.5 mm longo, laciniis parte inferiore anguste triangulari, superiore anguste spathulata, apice acutiusculo crassiusculo. Stamina filamentis c. 2.5 mm longo, anthera c. 2.5 mm longa obtusa. The specimens collected by KAUDERN moreover are entirely glabrous and bear young inflorescences that usually are 2-flowered, even the very young ones in the axils of the youngest leaves.

These specimens, like those already known before, resemble *Dendrophthoë pentandra* (L.) Miq. by the appearance of the open flowers, but are strikingly different from all *Dendrophthoë* species known, by

the angular twigs, the peculiar shape and nervation of the leaves, and the conical fruit that is warty when well-developed.

Scurrula ferruginea (JACK) DANS., cfr. Bull. Jard. Bot. Buitenz., ser. 3, 11, p. 432 (1931).

East Celebes, Pinapoean, 600 m alt., on grass land where before stood tall forest, Dec. 1919, T. KAUDERN 439 (L) tree.

This species is new for Celebes; it was not collected, before, more eastward than Borneo.

Scurrula parasitica LINN., cfr. Bull. Jard. Bot. Buitenz., ser. 3, 11, p. 434 (1931) sub *Sc. fusca*.

Island Banggai, Febr. 1920, W. KAUDERN 509 (L) parasite on a pompelmoose tree.

Ginalloa arnottiana KORTH.; cfr. Bull. Jard. Bot. Buitenz., ser. 3, 11, p. 449 (1931).

Island Banggai, Febr. 1920, W. KAUDERN 508 (L) parasite on a pompelmoose tree.

New for Celebes proper, though known from Karakélang and Salajar.

12. New Clemens-numbers from Mt. Kinabalu, Borneo.

Lepeostegeres centiflorus (STAFF) VAN TIEGHEM — 31995, 10 III 1933, Penibukan, W. Canon, 4000 ft, „flower pink”; 33785, 29 VI 1933, Colombon River, 7000 ft, „red bracts, flower tube pale yellow-green, anthers blood-red, tips cells yellow, fruit red”.

Macrosolen floridus DANSER — 30993, 16 I 1933, Penibukan, 4—5000 ft, near Table Rock, N. Ridge-top, mossy forest, „inflor. pink, frt. yellow”; 32517, 5 IV 1933, Marai Parai spur, 5—6000 ft, „fruit light orange”.

Macrosolen splendidus DANSER — 30359, 9 IX 1933, Penibukan, 4000 ft, „flower scarlet with black and white tips”; 31728, 2 III 1933, Kina Taki River, 8000 ft, „fruit bright red”.

Elytranthe albida (BLUME) BLUME — 32209, 17 III 1933, Canon W. of Penibukan, 4000 ft.

Helixanthera cylindrica (JACK) DANSER — 32622, 6 IV 1933, Marai Parai, 6—7000 ft.

Helixanthera maxwelliana (GIBBS) DANSER — 30923, 10 I 1933, Penibukan, 4—5000 ft, top Table Rock, ridge left above camp, „fl. bright red”.

Dendrophthoe quadrifida DANSER, n. sp. — Cfr. iconem (Fig. 1, c—e) — Ramuli foliaque novissima tantum tomentosa, mox omnino

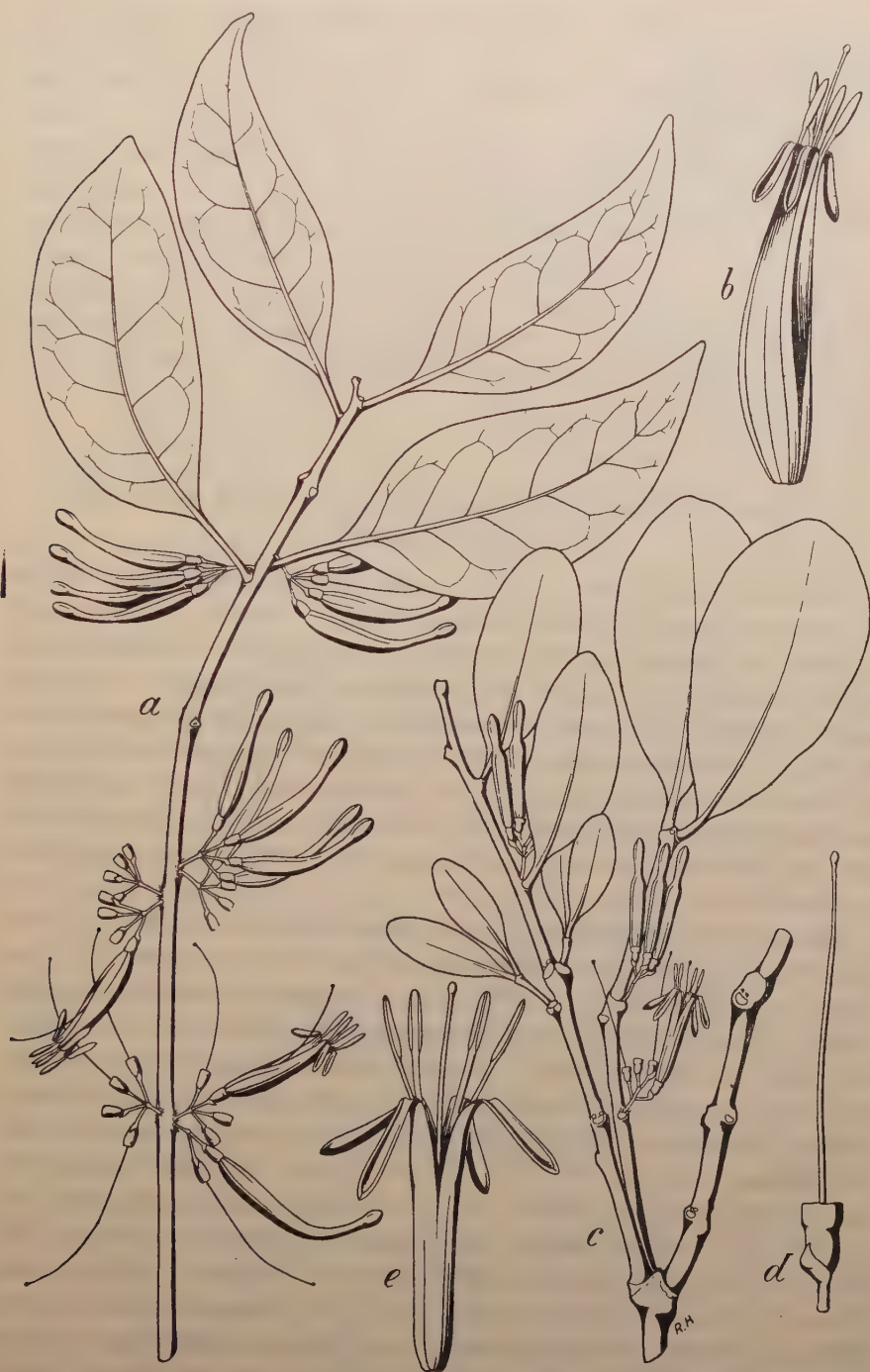
glabra; inflorescentiae et flores tomento denso sed tenui subferrugineo in corollis tenuescente vestiti. Caules erecti; internodia foliifera teretia plerumque 1—3 cm longa 1.5—2.5 mm crassa, insertionibus foliorum valde incrassatis. Folia sparsa vel passim subopposita; petiolus teres, laminam versus supra subtusque vix applanatus, 3—8 mm longus; lamina obovata ad obovato-lanceolata, basi cuneata apice rotundata, 2—6 cm longa, 0.8—3 cm lata, crassiuscula vel crassa, rigida, faciebus vix diversis opacis, penninervis, costa basin versus utrinque prominente, nervis lateralibus primariis utrinque visibilibus, facie superiore paulo distinctioribus quam facie inferiore. Inflorescentiae racemi breves axillares erecti paribus florum 1—3, plerumque 2, decussatis; pedunculus plerumque 2—7 mm longus; axis florifer 0—14 mm longus, nodis applanatis; pedicelli 1—3 mm longi; bractea late ovata amplexicaulis, acutiuscula, c. 1.5 mm longa. Calycis tubus subcylindraceus, c. 2 mm longus et latus, limbus erectus integer c. 1 mm longus; corolla regularis statu alabastri adulti 26—28 mm longa, a basi rotundata paululum dilatata, 3 mm lata, teres vel plicis 4 longitudinalibus ad circiter duas terias longitudinis, ibi annulo paulo magis dilatato, supra anulum abruptius in collum 1.5 mm crassum contracta, deinde in clavam apicalem 1.75—2 mm crassam 4-angulam obtusam incrassata, postea fissa ultra dimidiam longitudinem in lacinias 4 circiter 100 mm ab apice subabrupte dilatatas, supra dilatationem anguste spathulatas crassiusculas acutiusculas 1—1.25 mm latas; filamentum pars libera 5 mm longa valde applanata; anthera 4 mm longa filamento vix latior obtusissima, 4-locularis (non septata); stilus corolla vix longior, a basi ad apicem subaequicrassus, 4-angularis, in 4 mm superioribus paulo tenuior, sub stigmate 8-costulatus; stigma capitatum stilo duplo crassius, c. 0.6 mm crassum. Fructus ignotus.

On first sight much like a mountain summit form of a long-flowered *D. pentandra* by the erect twigs, leaves and inflorescences and the rigidity of all parts. The 4-merous flowers with deeply split corollas induced me to distinguish it as a new species.

33035, 30 IV 1933, Marai Parai spur, 5000 ft, „flower red with yellow throat”; 32743, 13 IV 1933, ridge below Marai Parai, 4000 ft, „flower red”, type.

***Scurrula parasitica* LINN.** — 28062, 27 I 1932, Tenompok, 5000 ft, „buds brown, frt. brownish green”; 32996, 27 IV 1933, Marai Parai,

Fig. 1 — a-b: *Taxillus sericeus*, after the type FORREST 9470; a: flowerbearing twig, $\frac{2}{3} \times$; b: corolla with stamens and style, $2 \times$; c-e: *Dendrophthoe quadrifida*, after the type CLEMENS 32743; c: flower-bearing twig, $\frac{2}{3} \times$; d: flower without corolla and stamens, $2 \times$; e: corolla with stamens and style, $2 \times$.



spur S. Sadikan River, 5000 ft, „flower, inflorescence and under leaf bright rusty brown”.

Ginalloa arnottiana KORTHALS — 31779, 23 II 1933, Upper Kina Taki river, 7000 ft.

Ginalloa nuda DANSER — 32078, 11 III 1933, Penibukan, below camp, 4000 ft, „fruit bright red”.

These materials, being much better than the type, allow to improve the description of the leaves of this curious species. They are not spathulate but *lanceolate*, 25—35 mm long, 3—7.5 mm broad, *subobtuse*. The well-developed pairs of leaves occur here and there at rather long intervals, and between them and the pairs reduced to a rim I did not find intermediary stages.

13. The Loranthaceae collected by George Forrest in Yunnan and adjacent regions.

Through the kindness of Prof. W. W. SMITH, Regius Keeper of the Herbarium of the Edinburgh Botanic Garden, I had the opportunity to revise the Asiatic *Loranthaceae* of that Herbarium, especially interesting by containing a complete set of the *Loranthaceae* collected by GEORGE FORREST in Yunnan and adjacent regions, for the greater part not yet, or only provisorily, named and affording many new and interesting taxonomic and floristic data. While giving a short account of my determinations of FORREST's *Loranthaceae* I take the opportunity to give also some remarks on few other specimens of the Edinburgh Herbarium collected in the same regions.

Macrosolen cochinchinensis (LOUREIRO) VAN TIEGHEM, Bull. Soc. Bot. Fr., 41 (1894) 122; *Loranthus cochinchinensis* LOUREIRO, Fl. cochinch., 1 (1790) 195. — N. E. Upper Burma, around Bhamo, Lat. 24°20' N., alt. 400 ft, IV 1917, FORREST 13619 (flowers red an green; cfr. Not. Bot. Gard. Edinb., 17, p. 6); hills around Tzi-tzo-ti, Lat. 25°58' N., Long. 98°29' E., alt. 7.000 ft, V 1925, FORREST 26614 (flowers orange, on conifers and *Quercus*). — China, Yunnan, flanks of the Mingkwong valley, Lat. 25°15' N., alt. 6—7.000 ft, V 1912, FORREST 7940 (flowers ruddy orange-yellow); N.W. of Tengyueh, Lat. 25°10' N., alt. 7—8.000 ft, VI 1912 FORREST 8231 (flowers yellowish-rose); *ibidem*, alt. 6.000 ft, VII 1913, FORREST 11840 (flowers pale-rose); *ibidem*, Lat. 25°30' N., Long. 98°25' E., alt. 8.000 ft, V 1931, FORREST 29605 (flowers yellow, on conifers); Tengyueh valley, Lat. 25° N., alt. 5300 ft, VI 1931, FORREST 29723 (flowers crimson, fruits yellow); divide between Shweli

and Tengyueh valleys, Lat. 25° N., alt. 7.000 ft, VII 1912, FORREST 8810 (on oaks and pines, fruits bright orange); Shweli valley, Lat. $25^{\circ}20'$ N., alt. 7.000 ft, VIII 1913, FORREST 12052 (flowers dull yellowish-crimson); western flank of Shweli-Salwin divide, Lat. $25^{\circ}45'$ N., alt. 9—10.000 ft, V 1919, FORREST 17921 (flowers deep orange-yellow; cfr. Not. Bot. Gard. Edinb., 17, p. 297); Shweli-Salwin divide, Lat. $25^{\circ}40'$ N., alt. 8.000 ft, VI 1919, FORREST 18109 (fruits orange-yellow; cfr. Not. Bot. Gard. Edinb., 17, p. 312).

With exception of the first number, all the above specimens belong to the same particular form of the widely spread and polymorphic *M. cochinchinensis*, characterised by more robust inflorescences and somewhat thickish corollas. To the same form also belong HENRY 11755A and 11755B from Szemao, Yunnan, in the Edinburgh Herbarium. Everyone who is acquainted with the polymorphy of this species will understand that it is useless to distinguish local forms as varieties, that hardly, or not at all, can be fixed by descriptions. Also LECOMTE's varieties *puberula*, *Harmandii* and *tonkinensis* of his *Loranthus globosus* (cfr. Not. Syst., 3, p. 98—99), hardly deserve, after my opinion, to be named. FORREST 13619 and ROCK 2683, from S. Yunnan, between Keng Hung and Muang Hing, represent the form common in the Malay Archipelago.

Macrosolen Robinsonii (GAMBLE) DANSER, in Bull. Jard. Bot. Buitenz., ser. III, 10, p. 345 (1929); *Elytranthe Robinsonii* GAMBLE, in Kew Bull. (1913) 45. — China, Yunnan, Shweli-Salwin divide, Lat. $25^{\circ}30'$ N., alt. 10.000 ft, VIII 1917, FORREST 15709 (shrub of 2—3 ft, parasitic on oaks and pines, flowers deep crimson and green; cfr. Not. Bot. Gard. Edinb., 17, p. 154).

This species was only known from Gunong Tahan in the Malay Peninsula, where it has been collected few times at altitudes of between 3.000 and 5.000 ft. FORREST's specimen differs from those from Gunong Tahan by unimportant characters certainly insufficient for specific distinction, viz. somewhat longer corollas (13—15 instead of 11—13 mm long), inflorescences not only on the leafless nodes but even for the greater part in the axils of the leaves and usually 2-flowered instead of usually 4-flowered.

Elytranthe albida (BLUME) BLUME, in SCHULTES, Systema veg., VII, 2, p. 1611 (1830); *Loranthus albidus* BLUME, in Verh. Bat. Genootsch., 9, p. 184 (1823). — China, Yunnan, Shweli-Salwin divide, Lat. 25° N., alt. 7—8.000 ft, V 1919, FORREST 17909 (shrub of 2—3 ft, flowers deep crimson, orange and red tipped; cfr. Not. Bot. Gard. Edinb., 17, p. 206; *ibidem*, $24^{\circ}50'$ N., alt. 7—8.000 ft, VIII 1919,

FORREST 18432 (shrub of 1—3 ft, flowers fleshy deep crimson, green tipped, parasitic on oaks and pines; cfr. Not. Bot. Gard. Edinb., 17, p. 337).

In the Edinburgh Herbarium there is also a specimen of HENRY 11604A, from Yunnan, Szemao, on which LECOMTE based *Elytranthe Henryi*, but neither FORREST's plants, nor HENRY's, nor KING's *Loranthus Collettii* from the Shan Hills, nor MERRILL's *Elytranthe Petelotii* from Indo China, nor MOORE's *Loranthus dranensis* from Siam, can be separated from BLUME's *Elytranthe albida*, originally described from Java, but widely spread and strongly varying in the western part of the Malay Archipelago inclusive the Malay Peninsula, and already recorded by J. D. HOOKER from the Khasia Hills.

Helixanthera parasitica LOUREIRO, Fl. cochinchin., 1 (1790) 142. — China, Yunnan, Shweli valley S. of Tengyueh, Lat. 24°42' N., alt. 5—6.000 ft, II 1918, FORREST 16148 (flowers bright rose, anthers creamy yellow; cfr. Not. Bot. Gard. Edinb., 17, p. 178); 3 days S. of Tengyueh, Lat. 24°20' N., Long. 98°33' E., alt. 5—6.000 ft, V 1925, FORREST 26391 (flowers purple-rose, anthers yellow).

Helixanthera scoriarum (W. W. SMITH) DANSER, Bull. Jard. Bot. Buitenz., ser. III, 10, p. 318 (1929); *Loranthus scorarium* W. W. SMITH, in Not. Bot. Gard. Edinb., 10, p. 184 (1917). — China, Yunnan, Tengyueh, Lat. 25° N., alt. 5.000 ft, V 1912, FORREST 7689 (type of *Loranthus scorarium* W. W. SMITH, shrub of 2—4 ft, flowers reddish-orange); Shweli-Salwin divide, Lat. 25°45' N., Long. 98°40' E., alt. 9—10.000 ft, VI 1924, FORREST 24428 (parasitic shrub of 3—4 ft, on oaks and conifers, flowers dull-crimson-based, slipped dull green).

This species is not yet known from other localities. The type specimen has corollas nearly 10 mm long, the second specimen is somewhat more robust in all parts and has corollas up to 12 and 13 mm long.

The genus **Hyphear** comprises a number of closely allied species that, after the most important specific differences mentioned in literature, may be arranged in the following synoptical key.

Spikes terminal on short leafy twigs. Flowers sessile.

Plant dioecious.

Flowers 6-merous **H. europaeum**

Flowers 5-merous **H. Owatarii, H. Tanakae**

Flowers hermaphrodite.

Flowers 6-merous **H. Grewinkii**

Flowers 5-merous **H. Lambertianum**

Spikes axillary. Flowers inserted in hollows of the axis, 6-merous.

Flowers hermaphrodite **H. odoratum, H. pseudo-odoratum, H. Hemsleyanum**

Plant dioecious **H. Delavayi**

The difference between species with flowers sessile, in spikes terminal on short leafy twigs, and such with flowers inserted in hollows of the axis of lateral spikes, is striking. On this difference is based the distinction of the *Viscoidei* and *Odorati* by DE CANDOLLE (Prodr., 4, p. 294) and that of the sections *Euloranthus* and *Cyttarellus* by VAN TIEGHEM (Bull. Soc. Bot. Fr., 41, p. 535—536).

All other characters used for the distinction of the species are of little systematic value. The number of petals and stamens is, among *Loranthoideae*, nowhere sufficient for specific distinction, and especially in *Helixanthera* and allied genera it is of very little systematic value. Moreover the number of petals appears not to be constant in *Hyphear europaeum*, as its flowers are in general 6-merous, but partly 5- and even 4-merous. If *H. Tanakae* really differs from *H. europaeum* mainly by 5-merous flowers, the doubt is justified whether it is specifically different. The same can be said about the difference between *H. Lambertianum* and *H. Grewinkii*. *Hyphear Owatarii* is very inadequately described, and from the description we cannot state any difference with *H. Tanakae*.

Also it is questionable whether hermaphrodite *Hypheata* may be always regarded as specifically different from such with hermaphrodite flowers. The flowers of *H. europaeum* are not always described as dioecious, but often as polygamic-dioecious, and what I have seen of *H. Delavayi* suggests that the same might be the case with this species. Moreover it is always possible, that male specimens may be looked upon as hermaphrodite. Among the species described with axillary inflorescences, *H. Delavayi* is perhaps not specifically different from *H. odoratum*, and still less important are the differences given for the distinction of *H. pseudo-odoratum* and *H. Hemsleyanum*. *Hyphear pseudo-odoratum* is said to differ from *H. odoratum* mainly by pruinose twigs and somewhat smaller leaves and inflorescences, differences that certainly are entirely insufficient for distinction of species. Specimens with pruinose twigs I found also between the Yunnan specimens of *H. Delavayi*, and this peculiarity may be caused by the mode of preparing the specimens for the herbarium. *Hyphear Hemsleyanum*, indeed, is described as possessing hermaphrodite flowers, but these flowers are said to have a „stylus gracilis brevis”, and we justly find such styles in the male specimens of *H. Delavayi*. It is therefore that, among the materials enumerated below, I did not distinguish more than 2 species. Cfr. also the remarks to these.

Hyphear Delavayi (VAN TIEGHEM) DANSER, in Bull. Jard. Bot.

Buitenzorg, ser. III, 10, p. 319 (1929); *Loranthus Delavayi* VAN TIEGHEM, in Bull. Soc. Bot. Fr., 41, p. 535 (1894). — China, Yunnan, south side of Chao Cheo valley, alt. 7.000 ft, III 1905, FORREST 540 (on oak); Shweli valley, Lat. 25° N., alt. 6.000 ft, II 1913, FORREST 9564 (flowers brownish-yellow); *ibidem*, FORREST 9642 (flowers dull brownish-orange); *ibidem*, FORREST 9643 (flowers dull-orange, anthers light yellow); Lichi-ang Range, Lat. 27°35' N., alt. 10.000 ft, VI 1913, FORREST 10149 (on oak); Salwin valley, Lat. 28°10' N., alt. 7.000 ft, IX 1917, FORREST 16196 (flowers olive-brown, on oaks and pines; cfr. Not. Bot. Gard. Edinb., 17, p. 181).

Moreover I will mention the following specimens seen by me in the Edinburgh Herbarium; China, Yunnan, Mou-gni-chan, près de Taping-tze, 1800 m alt., 20 I 1887, DELAVAY 2312 (first no. cited by VAN TIEGHEM of his *Loranthus Delavayi*); bois de Mou-gni-chan, au-dessus de Pien-kio, 12 II 1888, DELAVAY 4653 (3rd no. cited by VAN TIEGHEM); Tibet, Tse-kou, 1800 m alt., 1912, MONBEIG s. n. (cfr. LECOMTE, Not. syst., 3, p. 196); China, Hupeh, HENRY 7849 (cfr. FORBES & HEMSLEY in Journ. Linn. Soc., bot., 26, p. 406); western Hupeh, WILSON 3524); Burma, S. Shan States, Loi Mwe, 5.000 ft alt., MACGREGOR 86.

Of these specimens FORREST 16196 and MONBEIG s. n. are distinctly female, as styles and stigmas are strongly developed and anthers are entirely absent. Very probably male are those specimens of which the anthers are well-developed and the styles thin and attenuate towards the tip, that hardly bears a stigma, viz. FORREST 9564, 9642, 9643, DELAVAY 2312, 4635, HENRY 7849, WILSON 3524, MACGREGOR 86. The number FORREST 10149 is fruit-bearing; FORREST 540 is apparently hermaphrodite, as anthers are well-developed and the style is cylindrical and bears a well-developed stigma, though less clavate than in the female specimens cited. According to the key given in the above this specimen ought to be named *H. odoratum*, but as I cannot see any further differences with undoubtedly correctly named *H. Delavayi*, I give this specimen the same name.

Hyphear europaeum (JACQUIN) DANSER, in Bull. Jard. Bot. Buitenzorg, ser. III, 10, p. 319 (1929); *Loranthus europaeus* JACQUIN, Enum. stirp. Vindob., p. 230 (1762). — China, N.W. Yunnan, Mekong, Yangtze divide, around Wei Hsi, Lat. 27°12' N., Long. 99°18' E., alt. 9—10.000 ft, X 1921, FORREST 20953 (fruits clear transparent yellow, on *Quercus*, cfr. Not. Bot. Gard. Edinb., 14, p. 216).

The specimen is in fruit and only few leaves are present between the fruit sticking together. Though I cannot see whether the flowers

have been 5- or 6-merous, nor whether the flowers have been female or hermaphrodite, it is so much like a fruit-bearing specimen of *H. europaeum* that I see no reason to give it another name. The specimen Rock 14750, from S.W. Kansu, lower Tebbu country, in Mayaku, alt. 7500 ft (in the Edinburgh Herbarium) appears to be wholly identical. Cfr. the remarks above.

Scurrula elata (EDGEWORTH) DANSER, in Bull. Jard. Bot. Buitenz., ser. III, 10, p. 350 (1929); *Loranthus elatus* EDGEWORTH, Transact. Linn. Soc., 20, p. 58 (1846). — China, Yunnan, western flank of the Shweli-Salwin divide, Lat. 25°20' N., alt. 8—10,000 ft, VIII 1912, FORREST 8906 (flowers orange-red, shaded to dull sage at apex, stamens crimson, on oaks and pines).

This species is widely spread in the Himalayas. The locality where FORREST collected it probably is the most eastern known hitherto.

Scurrula ferruginea (JACK) DANSER, in Bull. Jard. Bot. Buitenz., ser. III, 10, p. 350 (1929); *Loranthus ferrugineus* JACK, in Mal. Misc., 1, p. 279, t. 59 (1820). — China, Yunnan, Shweli valley, Lat. 25° N., alt. 7,000 ft, II 1913, FORREST 9685 (flowers brown).

Scurrula ferruginea is common in the adjacent part of Burma and more southward, but I do not know more northern localities.

Scurrula gracilifolia (SCHULTES) DANSER, nov. comb.; *Loranthus gracilifolius* SCHULTES, Syst. veg., VII, 1, p. 99 (1829); *Loranthus graciliflorus* D. C., Prodr., 4, p. 300 (1830); *Loranthus chinensis* BENTH., Fl. hongkong., p. 141 (1861); an D. C., Mém. Lor., p. 28, t. 7 (1830) et Prodr., 4, p. 301 (1830)?; *Loranthus Scurrula* var. *graciliflorus* KURZ, For. Fl. Burma, 2, p. 319 (1877); Hook. f., Fl. Br. Ind., 5, p. 209 (1886).

China, Yunnan, Shweli valley, Lat. 25° N., alt. 6,000 ft, VIII 1912, FORREST 8857 (base of tube of perianth ochre yellow shaded to green at apex, filaments deep crimson, anthers orange, on pines); Yung-pe Mts., Lat. 26°45' N., alt. 10,000 ft, IX 1913, FORREST 11086 (flowers base exterior grey-orange, apex grey-green, interior dull green, on pines); Shweli-Salwin divide, Lat. 25°30' N., alt. 9—10,000 ft, VIII 1918, FORREST 17534 (flowers greyish-red, on pines; cfr. Bot. Gard. Edinb., 17, p. 270).

A peculiar *Scurrula*, closely allied to the polymorphic and widely spread *Sc. parasitica*, but probably specifically as distinct as the other *Scurrulae* and strikingly different by entirely glabrous foliage only tomentose in the very young state, and very slender flower-buds and flowers.

Entirely the same form is represented by the numbers LACE 5373

and 5417, both from Burma, Maymyo, 3400—3500 ft alt., in the Edinburgh Herbarium; apparently the same species, though with smaller leaves, is the number EM. BODINIER 792, from Hongkong, in the same herbarium. Probably also the following specimens without flowers: FORREST 526, without exact locality, and FORREST 9299, from Yunnan, N. of Tengyueh, Lat. $25^{\circ}15' N.$, alt. 8.000 ft, XI 1912.

Scurrula philippensis (CHAM. & SCHLECHT.) G. DON, Gen. Hist. Diehl. Pl., 3, p. 422 (1834); *Loranthus philippensis* CHAM. & SCHL., in Linnaea, 3, p. 204 (1828). — China, Yunnan, Shweli valley, Lat. $25^{\circ} N.$, alt. 6.000 ft, VII 1912, FORREST 8665 (exterior of perianth bright brown at base shading green towards apex, limb green, filaments red or red-orange, anthers yellow, on oak and pine); mountains N.E. of the Yangtze bend, Lat. $27^{\circ}45' N.$, alt. 10—11.000 ft, VIII 1913, FORREST 10928 (flowers dull soft orange at base, shaded to dull olive green at apex, interior deep maroon, on pines and *Salix*); Tale Range, Lat. $25^{\circ}40' N.$, alt. 10.000 ft, IX 1913, FORREST 11633 (flowers interior maroon, exterior dull grey, on pines) and VII, 1913, FORREST 11650 (flowers interior deep crimson-maroon, exterior grey towards apex, with dull orange base, on *Salix* and pines); N'Maikha-Salwin divide, Lat. $26^{\circ}20' N.$, alt. 9.000 ft, VI 1919, FORREST 18062 (flower tube dull brownish-grey, petals green, on pines and oaks; cfr. Not. Bot. Gard. Edinb., 17, p. 308).

I cannot distinguish this from the Philippine *Sc. philippensis*, but probably it is conspecific with *Sc. cordifolia* (WALL.) G. DON, a species I do not know sufficiently.

Taxillus Delavayi (VAN TIEGHEM) DANSER, in Verh. Akad. Wetensch. Amsterd., afd. Natuurk., sect. 2, 29, 6, p. 123 (1933); *Phyllodesmis Delavayi* VAN TIEGHEM, in Bull. Soc. Bot. Fr., 42, p. 265 (1895); *Loranthus Delavayi* ENGLER, in ENGL. & PR., Nat. Pflanzenfam., Nachtr., p. 131 (1897) non VAN TIEGHEM (1894); *Loranthus Balfourianus* DIELS, in Not. Bot. Gard. Edinb., 5, p. 250 (1912). — E. Upper Burma, western flank of the Chimi-li, N'Maikha-Salwin divide, Lat. $26^{\circ}21' N.$, Long. $98^{\circ}48' E.$, alt. 9.000 ft, VI 1924, FORREST 24595 (flowers flame-crimson, tipped green, on conifers and poplars); N.E. Burma, side valleys on the N'Maikha-Salwin divide, Lat. $26^{\circ}20' N.$, alt. 8—9.000 ft, VI 1931, FORREST 29752 (flowers orange-crimson, tipped green). — China, Tibet banks of the Mekong between Bati and Tsekou, alt. 6.000 ft, 1904, FORREST 543 (first type of *Loranthus Balfourianus* DIELS); Yunnan, eastern flank of the Lichiang Range, Lat. $27^{\circ}10' N.$, alt. 10.000 ft, V 1906, FORREST 2215 (flowers orange-crimson, fruit yellow, mostly on *Prunus* and *Salix*, second type of *Loranthus Balfourianus* DIELS); *ibidem*,

alt. 9—10.500 ft, V 1910, FORREST 5622 (tube of corolla crimson, limb green, on pines, *Rosaceae* and *Tiliaceae*); N. of Tengyueh, Lat. 25°15' N., alt. 7.000 ft, V 1912, FORREST 7718 (flowers deep flame red, with limb of corolla green, on pines and other trees); mountains in the N.E. of the Yangtze bend, Lat. 27°45' N., alt. 10.000 ft, VII 1913, FORREST 10579 (on pines, fruits scarlet).

This species is widely spread and common in eastern China, and apparently also occurs in the adjacent part of Upper Burma. The number DELAVAY 2620, on which VAN TIEGHEM based his *Phyllodesmis Delavayi* and of which I saw a specimen in the Edinburgh Herbarium, is identical with the numbers FORREST 543 & 2215, on which DIELS based his *Loranthus Balfourianus*; in the genus *Taxillus* the species name *Delavayi* has priority over that of *Balfourianus*.

Taxillus Kaempferi (DE CANDOLLE) DANSER, in Verh. Kon. Akad. Wetensch. Amsterd., afd. Natuurk., sect. 2, 29, 6, p. 124 (1933); *Viscum Kaempferi* D. C., Prodr., 4, p. 285 (1830); *Loranthus caloreas* DIELS, in Not. Bot. Gard. Edinb., 5, p. 251 (1912). — China, Yunnan, eastern flank of the Lichiang Range, Lat. 27°15' N., alt. 9—11.000 ft, VII 1906, FORREST 2600 (flowers bright scarlet, limb of perianth bright green, on conifers only, type of *Loranthus caloreas* DIELS); *ibidem*, Lat. 27°30' N., alt. 10—11.000 ft, VII 1910, FORREST 6147 (flowers crimson and green, fruit yellow, on conifers); mountains in the N.E. of the Yangtze bend, Lat. 27°45' N., alt. 10—11.000 ft, VIII 1913, FORREST 10760 (flowers orange-red tipped deep olive green, on conifers especially *Tsuga*); Tali Range, Lat. 25°40' N., alt. 10.000 ft, VI 1913, FORREST 11663 (flowers red-orange and maroon, on pines); Lichiang Range, Lat. 27° N., alt. 11.000 ft, VII 1918, FORREST 16310 (fruits red-orange, parasitic on conifers; cfr. Not. Bot. Gard. Edinb., 17, p. 189); Shweli-Salwin divide, Lat. 25°40' N., alt. 7—8.000 ft, VI 1919, FORREST 18072 (flowers green, on pines and other trees; cfr. Not. Bot. Gard. Edinb., 17, p. 309).

Somewhat doubtful by broader leaves, and with unripe fruit only: Yangtze valley between Chu Tim and Shih Ku, alt. 6—7.000 ft, 1904, FORREST 614 (on oak).

I cannot distinguish *Loranthus caloreas* DIELS from the Japanese *Taxillus Kaempferi* otherwise than by larger flowers, more robust vegetative parts and very young parts covered with ferrugineous indumentum but soon becoming glabrous. The corollas of the Japanese plant are, as far as known to me, 14—15 mm long; the type of *Loranthus caloreas* has corollas extremely long, viz. 28—32 mm, but in the Edinburgh Herbarium the other specimens of the latter species show a rather strong

variability of the corolla length, down to 25 mm, whereas there is one specimen from southern Chekiang (CHING 2402) agreeing with *Loranthus caloreas* by rusty-hairy young parts, but with corollas only 11–12 mm long.

The species also occurs west of the Chinese border, as show the following specimens in the Edinburgh Herbarium: Bhutan, Chalimarphé, Timpu, alt. 7.000 ft, 8 VII 1914, R. E. COOPER no. 1398 (on *Pinus*), and Bhutan, Paro, alt. 9.000 ft, 7 XI 1914, R. E. COOPER no. 3567 (on *Pinus*).

Taxillus sericus DANSER, n. sp. — Cfr. iconem (Fig. 1, *a*—*b*) — Partes iuveniles pilis stellatis tenuiter sed dense vestitae, ramuli foliaque mox glabra, pedicelli prope apicem, bractee et calyces omnino indumento usque ad tempus florendi persistente, corolla dum aperta iam glabrescens. Ramuli teretes, novissimi sub nodis paulum angulati, rugulosi, nec opaci, nec lucidi, vetustiores opaci, nodis incrassatis. Folia sparsa vel subopposita; petiolus basi teres, laminam versus subtus rotundatus supra applanatus vel leviter canaliculatus, 10–17 mm longus; lamina oblonga vel ovato-oblonga, 6–10 cm longa, 2.5–4 cm lata, sub basi cuneata in petiolum contracta, margine saepe irrugulari, apice obtusiusculo, tenuiter coriacea, facie superiore subluceida inferiore opaca, penninervis nervis usque ad venas utrinque visibilibus facie inferiore prominulis. Inflorescentiae paulatim in axillis vel gregatim in nodis vetustioribus, umbellae pedunculatae floribus plerumque 4; pedunculus teres 3–5 mm longus, basi apiceque incrassatus 0.75 mm crassus, medio 0.3–0.6 mm crassus, paribus florum 2 decussatis; pedicelli pedunculo aequilongi vel paulo longiores, ad 0.2 mm crassi; bractea ovata basi annulo angusto calycis basin amplectens, obtusa, 0.75–1 mm longa. Calyx campanulato-infundibuliformis, 2–2.5 mm longus, apice circiter 1.5 mm latus, limbo subnullo; corolla statu alabastri adulti ad 30 mm longa, supra basin mox inflata ad 3 mm lata, supra medium gradatim angustata, ad 6–7 mm ab apice in collum 1–2 mm crassum angustata, supra collum in clavam apicalem oblongam obtusissimam 1.5–2.5 mm crassam incrassata, postea divisa in lacinias 4 secundas 8–9 mm longas parte superiore 5 mm longa reflexa 1 mm lata lanceolato-spathulata, fissura singula ultra medium corollae longitudinis producta; anthera 5 mm longa, sessilis, obtusissima, loculis 4 distinctis non septatis; stilus 30 vel 31 mm longus, filiformis, c. 0.2 mm crassus, parte inferiore 4-angularis; stigma globosum, c. 0.4 mm crassum. Fructus ignotus.

China, Yunnan, western flank of the Shweli-Salwin divide, Lat. 25°20' N., alt. 9.000 ft, XII 1912, FORREST 9470 (parasitic shrub of 2 ft, on pines, base of corolla deep orange, exterior of upper portion deep

green, interior dark maroon; type); S. of Tengyueh, Lat. 25°, alt. 6,000 ft, II 1913, FORREST 9622 (parasitic shrub of 2—3 ft, flowers red and green); Sikkim, Burmiak, alt. 4,000 ft, 1 XII 1908, W. G. CRAIB 458.

Taxillus sericus is a peculiar intermediate between the aberrant *T. Delavayi* and some more normal, *Scurrula*-like species, like *T. yadoriki*. Whereas *T. Delavayi* is peculiar by angular, shining, somewhat umbellately branched twigs, strongly attenuate indistinctly petioled leaves hardly different above and beneath, sessile nearly glabrous inflorescences often surrounded by a few-leaved rosette, and a distinct calyx limb, these peculiarities are only partly found in *T. sericus*. Here the angles of the twigs are hardly developed and the twigs are not or little shining; the subumbellate branching is never distinct; the leaves are rather strongly attenuate at the base, but more distinctly petioled and somewhat shining above; the inflorescences are peduncled and never bear leaf-rosettes at their base; the apical part of the pedicels, the bracts and the calyces are sparingly but distinctly hairy; the calyx limb is almost none, the corolla is nearly as in *T. Delavayi*. It would not at all look impossible that *T. sericus* were a species hybrid, if the anthers were not nearly sessile. Though the length of the filaments is variable in *T. Delavayi* as well as in *T. yadoriki* and its allies, I never met with a specimen with sessile anthers.

These remarks mainly bear on the type specimen FORREST 9470; the other specimens are little different but the anthers are broken off in the well-developed flowers. The specimen FORREST 9622 is somewhat smaller in all parts and the corollas are only 20 mm long; it bears fruit somewhat better developed, slightly serobiculate or very superficially warty. The third specimen, CRAIB 458, bears longer flowers with corollas nearly 35 mm long and their tube less inflated; the inflorescences are slightly coarser, their peduncles only 2 mm long, their indumentum less sparse. In spite of its being found so far from the other specimens the resemblance is striking.

Taxillus thibetensis (LECOMTE) DANSER, in Bull. Jard. Bot. Buitenz., ser. III, 10, p. 355 (1929); *Loranthus Duclouxii* & *L. thibetensis* LECOMTE, Not. syst., 3, p. 166, 168 (1915). — China, Yunnan, N.E. of the Yangtze bend, Lat. 27°45' N., alt. 11,000 ft, VII 1913, FORREST 10342 (flowers dull green, anthers orange, on pines and ever-green oaks); on the Li-ti-ping, Lat. 27°12' N., alt. 9,000 ft, VI 1917, FORREST 13882 (flowers red-orange and green, on oaks; cfr. Not. Bot. Gard. Edinb., 17, p. 25); Mekong divide, Lat. 26°40' N., Long. 99°40' E., alt. 9—11,000 ft, VII 1922, FORREST 23085 (flowers exterior greyish interior deep maroon, on

various conifers and *Pyrus*; cfr. Not. Bot. Gard. Edinb., 14, p. 377).

The same species is represented by several other specimens in the Edinburgh Herbarium, all of them from China: Thibet Oriental, Tsekou, VI 1895, SOULIÉ s. n. (double of the Muséum d'Histoire Naturelle, Paris, labelled there as *Loranthus thibetensis* LEC. and identical with the type SOULIÉ 1340 and with SOULIÉ s. n. in the Herbarium of the Muséum d'Histoire Naturelle at Paris); Yunnan, vicinity of Yun-nan-sen, MAIRE 1917; Yunnan, plaine de Kiao-kia, alt. 400 m, MAIRE s. n.; Kiao-kia, 14 II 1909, DUCLOUX 1277 coll. S. TEN; prope urbem Yünnanfu, 1800—2200 m alt., 27 IV 1915, HANDEL-MAZZETTI 1601; inter Yung peh ad flumen Yangtze, 2300 m alt., 3 VII 1914, SCHNEIDER 1725; Szechuan australis, inter Woholo & Choso, 2800 m alt., 15 VI 1914, SCHNEIDER 1576.

The type of *Loranthus Duclouxii* LECOMTE (DUCLOUX 6272) I saw in the Paris Herbarium; it shows hardly any difference with the specimens labelled as *Loranthus thibetensis* by LECOMTE himself.

Taxillus vestitus (WALLICH) DANSER, in Bull. Jard. Bot. Buitenz., ser. III, 10, p. 355 (1929); *Loranthus vestitus* WALLICH, in ROXB., Fl. ind., ed. 1, II, p. 218 (1824). — China, banks of the Yangtze between Chu Tim and Shi Ku, 6—7.000 ft alt., 1904, FORREST 524 (on evergreen oak); Mekong valley, Lat. 27°40' N., alt. 9.000 ft, VII 1914, FORREST 12935 (on oaks); Chungtien plateau, Lat. 27°40' N., alt. 11.000 ft, VI 1917, FORREST 13879 (on pines and *Salix*; cfr. Not. Bot. Gard. Edinb., 17, p. 25).

This species is spread westward all over the Himalayas to Punjab, and appears to reach its eastern frontier in Yunnan. Cfr. the remark on its relationships below.

As among FORREST's specimens the closely allied species *T. thibetensis* and *T. vestitus* appear to occur, I should like to make some remarks about the difference between these two species and their nearest allies *T. yadoriki*, *T. sutchuenensis* and *T. Cavaleriei*.

Taxillus yadoriki (MAXIM.) DANSER, in Bull. Jard. Bot. Buitenz., ser. III, 11, p. 445 (1931); *Loranthus Yadoriki* MAXIMOWICZ, Bull. Ac. Sc. St. Petersb., 22, sep. p. 609 (1876), is so closely allied to *T. thibetensis* and to *T. vestitus* that it looks not at all impossible that these 3 species might be geographic variations of one widely spread polymorphic species. It is not at all easy to indicate exact differences.

Taxillus vestitus is peculiar by thickly coriaceous, obovate-oblong leaves, that are soon glabrous and shining above, densely tomentose beneath like the petioles and twigs, by short flowers (the corolla 12—14 mm long), and abundantly developed oblong fruit that have a

granulate surface and are nearly sessile by 2 or 3 on the tip of a short and thick peduncle (usually 1—2 mm long).

Taxillus yadoriki on the contrary has roundish leaves with a less thick, darker-coloured and finally less copious tomentum, pedicels longer than the peduncle (viz. 3—4 mm long) and longer flowers (corolla 20—25 mm long).

Taxillus thibetensis shows more resemblance with *T. yadoriki* than with *T. vestitus*, but in general it is somewhat more robust than the former and its tomentum is denser and more light-coloured, the peduncles are shorter (1—2 mm long or even shorter), the pedicels variable in length (1—5 mm), the flowers larger (corolla 22—32 mm long), the calyx limb more distinct though very short, the flowers often 5-merous (SCHNEIDER 1725 appears entirely 5-merous, MAIRE s. n. and FORREST 23085 partly, the other specimens mentioned are 4-merous), the loculi of the anthers are often transversely septate (in *T. vestitus* and *T. yadoriki* the calyx limb is wellnigh none, the flower 4-merous, the loculi are not chambered).

Taxillus sutchuenensis (LECOMTE) DANSER, in Bull. Jard. Bot. Buitenz., ser. III, 10, p. 355 (1929); *Loranthus sutchuenensis* LECOMTE, in Not. syst., 3, p. 167 (1915), is also slightly different from the above mentioned species, and I would hardly believe it to be a distinct species if there were not, in the Edinburgh Herbarium, so many specimens that entirely agree with LECOMTE's plant. I have seen the type (FARGES 444) in the Paris Herbarium, of which FARGES s. n. in the Edinburgh Herbarium apparently is a double. The differences are the much scarcer indumentum, dense and light-ferrugineous on the young parts, soon disappearing on the twigs, the petioles and the upper surface of the leaves, but persistent, dense and thin on the undersides of the leaves and on the inflorescences, growing sparse on the corolla; moreover the more ellipsoidal calyx, the more slender corolla nearly 25 mm long and 4-merous, the flower-bud more acute, the loculi of the anthers distinctly septate. The following specimens evidently belong to it.

China, Su-tchuen Oriental, distr. de Tchen-kéou-tin, FARGES s. n., identical with FARGES 444 and FARGES s. n. in the Paris Herbarium; prov. du Kouy-Tchéou, environs de Gan-pin, He-chê-teou, 8 VIII 1897, MARTIN et BODINIER No. 1796; W. Hupeh, VI 1900 (?), WILSON 809; prov. Hupeh, 1885—1888, HENRY 2496 & 5902; Chirushih, 1888, HENRY 5902A; Changyang, 1888, HENRY 5902B; Si-teou-qui, 28 VII 1902, LÉVEILLÉ 137 and without locality VIII 1904, ESQUIROL 175.

Taxillus Cavaleriei (LÉVEILLÉ) DANSER, n. comb. *Loranthus Cava-*

leriei LÉVEILLÉ, Cat. pl. Yunnan, p. 172, 1916), was quite obscure to me till I saw a specimen of the type number CAVALERIE 2660 in the Edinburgh Herbarium, from which was evident, that this species was a *Taxillus* most closely allied to those discussed above. Prof. W. W. SMITH kindly copied for me the original description that was inaccessible to me, and that runs as follows:

„(1) *Loranthus Cavaleriei* Lévl. nov. sp. Folia lanceolata valde coriacea obtusa nitida glaberrima petiolata, 3—4 mm; flores tetrameri; corolla gamopetala. Kouy-Tcheou: nord de Lo-Fou, Touan-Cha, nov. 1903 (J. Cavalerie 2660).”

This diagnose evidently being insufficient to recognise the species, I will give here a more complete description after the specimen in the Edinburgh Herbarium.

Taxillus Cavaleriei, *descriptio emendata*. — Ramuli teretes, nodis paulum tumidis, cano-fusci, iam inter folia lenticellis minutis numerosis, inter folia adulta 2.5—4 mm crassi, internodiis plerumque brevibus, rarius longioribus, 1—5 cm longis. Folia opposita; petiolus difficile a lamina distinguendus, 2—5 mm longus, subtus valde supra leviter convexus; lamina (probabiliter) oblonga ad ovato-lanceolata, ad 10 cm longa, 2—3.5 cm lata, sub basi rotundata vel cuneata in petiolum contracta, apice obtusa vel rotundata, crasse coriacea et fragilis, facie superiore lucidula, facie inferiore opaca, costa et nervis primariis supra magis (!) prominentibus quam subtus, nervis crassioribus supra indistinctis subtus invisibilibus, venis omnino invisibilibus. Pedunculus c. 2 mm longus, 0.75 mm crassus, apice paulum incrassatus vel dilatatus, cicatricibus florum 2 vel 3; pedicelli teretes, 2—3 mm longi, c. 0.3—0.4 mm crassi; bractea minima, c. 0.5 mm longa, forma indistincta. Calyx campanulatus, basi subtruncatus, 1.5 mm latus, apicem versus paulum attenuatus, limbo paulum dilatato, subintegro, brevissimo; corolla ad 30 mm longa, supra basin rotundatam c. 3 mm lata, deinde attenuata, in tertia parte longitudinis 1—1.5 mm lata, denique in clavam apicalem obtusissimam 2 mm crassam incrassata, postea divisa (altero latere vix profundius) in lacinias 4 anguste spathulatas crassiusculas acutiusculas, parte reflexa 5—6 mm longa 0.8—1 mm lata; filamenti pars libera 0.5—0.75 mm longa; anthera c. 4 mm longa, obtusissima, loculis 4 probabiliter septatis; stilus filiformis 4-angularis apicem versus vix attenuatus; stigma obovatum, obtusissimum. Fructus ignotus. Indumentum in partibus juvenilibus tenue sed densum, cano-fuscum, stellatum, in partibus vegetativis mox evanescens, in inflorescentiis et calycibus persistens tenue, in corolla adulta parcum stellatum.

Taxillus Cavaleriei is most closely allied to *T. sutchuenensis*, but differs by more oblong, thicker and less distinctly nerved laminae, that are soon glabrous also below, shorter and less distinct petioles, slightly longer peduncles and pedicels, shorter filaments and longer anthers, and somewhat longer corollas.

A plant that very well agrees with the type is HENRY 10057, also from China, Yunnan, Szemao, 6500 ft alt., slightly different, however, by somewhat longer petioles, less narrow leaves with more distinct nervation and less shining upper surface, and more ellipsoidal calyx tube, and by these differences coming nearer to *T. sutchuenensis*, but more different from this species by longer corollas (35 mm) and longer pedicels (4—5 mm). It is very well possible that *T. Cavaleriei* is not specifically distinct from *T. sutchuenensis*, and perhaps as little from other allied species.

Arceuthobium chinense LECOMTE, Not. syst., 3, p. 170 (1915) — China, Yunnan, ♀, eastern flank of the Lichiang Range, Lat. 27°30' N., alt. 12.000 ft, IX 1900, FORREST 6672 (plant of 1—4 inches, parasitic on *Pinus*); ♂, Lichiang Range, Lat. 27°35' N., alt. 12.000 ft, VI 1913, FORREST 10169 (tufted plant of 4—9 inches, flowers olive green, parasitic on *Pinus*); ♂, Mekong-Salwin divide, Lat. 28°12' N., alt. 10.000 ft, VII 1917, FORREST 14194 (shrub of 4—6 inches, flowers green, parasitic on *Pinus*; cfr. Not. Bot. Gard. Edinb., 17, p. 49); ♂, western flank of the Tali Range, Lat. 25°40' N., alt. 12.000 ft, VII 1917, FORREST 15557 (plant of 1—2 inches, parasitic on conifers; cfr. Not. Bot. Gard. Edinb., 17, p. 144).

The type (DELAVAY s.n.) is also from Yunnan.

Korthalsella Opuntia (THUNB.) MERRILL, in Bot. Mag. Tokyo, 30, p. 68 (1916); *Viscum Opuntia* THUNB., Fl. jap., p. 64 (1784). — China, Yunnan, on the Karni Pass, Lat. 28° N., alt. 9.000 ft, VI 1917, FORREST 13918 (parasitic plant of 4—6 inches on oak; cfr. Not. Bot. Gard. Edinb., 17, p. 28).

Viscum album LINN., Sp. pl., ed. 1, 2, p. 1023 (1753). — China, Shweli-Salwin divide, Lat. 25°45' N., Long. 98°58' E., alt. 9.000 ft, XI 1924, FORREST 25388 (fruits pale green).

Viscum articulatum BURMAN FIL., Fl. ind., p. 211 (1768) — China, Yunnan, Sung Kwei valley, alt. 7.000 ft, 1904, FORREST 542; Lichiang Range, Lat. 27°40' N., alt. 11.000 ft, VI 1913, FORREST 10174 (on pines); on the Tong Shan in the Yangtze bend, Lat. 27°20' N., alt. 9—10.000 ft, IX 1913, FORREST 11112 (on pines and oaks); *ibidem*, alt. 9.000 ft, VII 1914, FORREST 12719 (on pines and poplars); between Tan-tui and

Pungtzula, Lat. 28° N., alt. 10.000 ft, VI 1917, FORREST 13811 (stems orange-yellow, on oaks, cfr. Not. Bot. Gard. Edinb., 17, p. 20); on the descent from Lu-tien to the Yangtze, Lat. 27°12' N., alt. 8.000 ft, XI 1917, FORREST 16142 (on *Alnus*, fruits greeny-white; cfr. Not. Bot. Gard. Edinb., 17, p. 177); Shweli-Salwin divide, Lat. 25°40' N., alt. 10.000 ft, VII 1919, FORREST 18155 (fruit immature greenish-white, on pines and various other trees; cfr. Not. Bot. Gard. Edinb., 17, p. 316).

It is remarkable that FORREST never mentions the parasitism of this species on other *Loranthaceae*, which is the rule in the Malay Archipelago.

Index of herbarium numbers mentioned in this note. BODINIER 792 (*Sc. g.*), CAVALERIE 2660 (*T. C.*), CHING 2402 (*T. K.*), COOPER 1398 (*T. K.*), 3567 (*T. K.*), CRAIB 458 (*T. s.*), DELAVAY s. n. (*A. ch.*), 2312 (*H. D.*), 2620 (*T. D.*), 4653 (*H. D.*), DUCLOUX 1277 (*T. th.*), 6272 (*T. th.*), ESQUIROL 175 (*T. s.*), FARGES s. n. (*T. s.*), 444 (*T. s.*), FORREST 524 (*T. v.*), 526 (*Sc. g.*), 540 (*H. D.*), 542 (*V. ar.*), 543 (*T. D.*), 614 (*T. K.*), 2215 (*T. D.*), 2600 (*T. K.*), 5622 (*T. D.*), 6147 (*T. K.*), 6672 (*A. ch.*), 7689 (*H. so.*), 7718 (*T. D.*), 7940 (*M. c.*), 8231 (*M. c.*), 8665 (*Sc. ph.*), 8810 (*M. c.*), 8857 (*Sc. g.*), 8906 (*Sc. e.*), 9299 (*Sc. g.*), 9470 (*T. s.*), 9564 (*H. D.*), 9622 (*T. s.*), 9642 (*H. D.*), 9643 (*H. D.*), 9685 (*Sc. f.*), 10149 (*H. D.*), 10169 (*A. ch.*), 10174 (*V. ar.*), 10342 (*T. th.*), 10579 (*T. D.*), 10760 (*T. K.*), 10928 (*Sc. ph.*), 11086 (*Sc. g.*), 11112 (*V. ar.*), 11633 (*Sc. ph.*), 11650 (*Sc. ph.*), 11663 (*T. K.*), 11840 (*M. c.*), 12052 (*M. c.*), 12719 (*V. ar.*), 12935 (*T. v.*), 13619 (*M. c.*), 13811 (*V. ar.*), 13879 (*T. v.*), 13882 (*T. th.*), 13918 (*K. O.*), 14194 (*A. ch.*), 15557 (*A. ch.*), 15709 (*M. E.*), 16142 (*V. ar.*), 16148 (*H. p.*), 16196 (*H. D.*), 16310 (*T. K.*), 17534 (*Sc. g.*), 17909 (*E. a.*), 17921 (*M. c.*), 18062 (*Sc. ph.*), 18072 (*T. K.*), 18109 (*M. c.*), 18155 (*V. ar.*), 18432 (*E. a.*), 20953 (*H. e.*), 23085 (*T. th.*), 24428 (*H. so.*), 24595 (*T. D.*), 25388 (*V. al.*), 26391 (*H. p.*), 26614 (*M. c.*), 29605 (*M. c.*), 29723 (*M. c.*), 29752 (*T. D.*), HANDEL-MAZZETTI 1601 (*T. th.*), HENRY 2496 (*T. s.*), 5902 (*T. s.*), 5902A (*T. s.*), 5902B (*T. s.*), 7849 (*H. D.*), 10057 (*T. C.*), 11604A (*E. a.*), 11755A (*M. c.*), 11755B (*M. c.*), LACE 5373 (*Sc. g.*), 5417 (*Sc. g.*), LÉVEILLÉ 137 (*T. s.*), MAIRE s. n. (*T. th.*), 1917 (*T. th.*), MARTIN & BODINIER 1796 (*T. s.*), MACGREGOR 86 (*H. D.*), MONBEIG s. n. (*H. D.*), ROCK 2683 (*M. c.*), 14750 (*H. e.*), SCHNEIDER 1576 (*T. th.*), 1725 (*T. th.*), SOULIÉ s. n. (*T. th.*), 1340 (*T. th.*), WILSON 809 (*T. s.*), 3524 (*H. D.*).

14. *Lepeostegeres acutibracteus* Danser, n. sp. (Cfr. fig. 2).

Omnis glabra. Ramulus (unicus notus) robustus, internodiis levibus atrisque, 4.5—6.5 cm longis, terminali basi paulum applanato c. 4 mm crasso apicem versus magis applanato ancipite, abrupte in nodum sesquiplo latiore dilatato, internodiis inferioribus magis teretibus crassioribus ad 5 mm crassis, nodis applanatis incrassatis ad 10 mm latis, vetustioribus ignotis. Folia opposita; petiolus 3—12 mm longus, 1.5—

3.5 mm crassus, basi paulum tantum incrassatus, facie inferiore rotundatus, facie superiore prope basin planiusculus, laminam versus magis applanatus; lamina ovata vel oblonga, 5—9 cm longa, 2—6 cm lata, basi rotundata vel breve cuneata, apice plerumque acuta, rarius obtusiuscula vel nonnihil acuminata, crasse coriacea et rigida, facie superiore lucida inferiore opaca, costa facie inferiore omnis prominente apicem versus valde attenuata, facie superiore plana parte basali tantum visibili, nervis ceteris fere omnino invisibilibus. Inflorescentiae capitatae singulae vel paucae in axillis foliorum, omnino sessiles; receptaculum breve et planum; involucri bracteae crasse coriaceae, parte apicali et media carinatae, facie exteriori tamquam ferrugine tectae, in paribus 5 decussatis imbricatis dispositae; bracteae paris primi parvae, pauca mm tantum longae, rotundato-ovatae vel subreniformes, parium secundi et tertii et quarti gradatim longiores, suborbiculares apice in acumen longiusculum obtusiusculum prolongatae, paris quinti sicut quarti, sed lateribus arcuatim excisis, eo subsagittatae (paris quarti nonnunquam excisione simili sed multo minore). Flores circiter 13 (in capitulo examinato scilicet 10 peripherici et 3 centrales), pedicellis vix diversis omnibus 1.5—2 mm longis apice c. 1 mm latis basin versus paulo angustioribus, pressione angulatis, exteriorum nonnullis apice bracteola forma variabili praeditis, ceteris bracteola nulla. Calyx pressione omnino prismaticus, tubo c. 2—2.5 mm longo 1.5 mm lato, limbo erecto c. 1 mm longo margine membranaceo irregulariter lacerato; corolla statu alabastri adulti 21—22 mm longa, parte inferiore cylindrica calycis limbo aequilata, parte media fusiformiter inflata, parte superiore 5 mm longa cylindrica c. 1.5 mm lata apice obtusissima, postea ultra medium divisa in lacinias 6 parte inferiore anguste triangula superiore anguste spathulata, parte apicali 2.5—3 mm longa acute reflexa c. 0.6 mm lata apice crassiuscula et

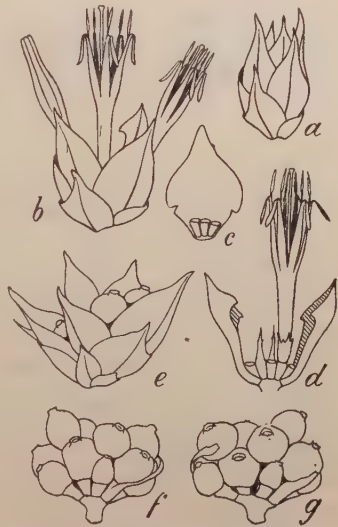


Fig. 2 — *Lepeostegeres aoutibracteus* DANSER, n. sp.. a: in florescence in bud; b: inflorescence in flower, with the flowers only part drawn, and with the outermost involucre bracts fallen off; c: involucre bract of the fourth pair, with three pedicels; d: receptacle with innermost involucre bracts, pedicels, bracteoles, and one flower; e: fruiting inflorescence; f—g: the same without involucre, seen from two opposite sides. All natural size.

obtusiuscula; filamenti pars libera c. 0.75 mm longa; anthera 2 mm longa, a basi ad apicem gradatim angustata, acuta; stylus corollae aequilongus, strictus, vix attenuatus, stigmatе subgloboso c. sesquiplo crassiore. Fructus subglobosi, ad 6 mm diametro, calycis limbo et disco persistentibus coronatus sed styli rudimento nullo, pedicellis paulum auctis, 2—5 mm longis.

Differt ab omnibus congeneribus bracteis involuerantibus carinatis acuminatis, receptaculo et corolla brevibus, et filamenti parte libera brevissima.

Philippines, Busuanga Island, IX 1922, BUREAU OF SCIENCE 41187 leg. RAMOS (one flowering and fruiting twig in the herbarium of the Museum of Natural History at Paris).

15. *Dicymanthes lombocana* Danser, n. sp.

Robustior, glaberrima. Internodia foliifera teretia, 6—17 cm longa, 2—5 mm crassa, primum levia postea lenticellosa, nodis valde incrassatis ad duplo crassioribus. Folia opposita, sessilia, ovata, 7—15 cm longa, 3—8 cm lata, basi rotundata vel cordata, apicem obtusiusculum versus acuminata, crassa, fragilia, utrinque opacissima, costa basin versus visibili, sed facie inferiore rufa crassiore quam facie superiore, nervis ceteris vix visibilibus. Capitula gregata in axillis foliorum et circum nodos defoliatos; pedunculus 0.5—2 mm longus, c. 1.5 mm crassus, maxima parte in scrobiculo corticis immersus; bractee brevissimae breve obtuseque triangulares, c. 0.5 mm longae; bracteolae paulo distinctiores vix maiores. Calycis tubus campanulatus, c. 2.5 mm longus, 1.25 mm latus, limbus erectus vel nonnihil cupuliformis, integer vel brevissime dentatus, c. 0.5 mm longus. Corolla statu alabastri adulti 1.25 mm longa, supra basin rotundatam c. 2.25 mm lata, in tertia parte inferiore gradatim attenuata, in tertia parte media c. 1 mm lata 5-angula, in tertia parte superiore in clavam 5-angulam obtusiusculam 1.25—1.5 mm crassam incrassata, latere interiore ad c. 2 mm supra basin squamulis 5 brevibus rotundatis deflexis, statu aperto ignota. Antherae c. 3 mm longae. Stylus quam corolla paulo longior, a basi ad apicem attenuatus; stigma styli apice vix crassius, subglobosum. Fructus ignotus.

Lombok, G. Rindjani, Mt. Poesoek, Sembaloen valley, 1300—1500 m alt., ELBERT 1700.

I had to describe this species after not very good materials. All the leaves are more or less broken, the flowers unopened but probably

adult for the greater part. Most closely allied are *Dicymanthes elliptica* DANSER, from Java and Selebes, with small scales at the inside of the petals and different leaf-shape, and *Dicymanthes longipes* DANSER, from Bali, with much longer peduncles and likewise different leaf-shape. The Philippine *Dicymanthes* species show more important differences. The little developed bracts and bracteoles of *D. lombocana* are very peculiar.

CHLOOTHAMNUS, A NEGLECTED GENUS OF BAMBUSACEAE,

by

J. T. H. HENRARD

(Leiden).

Although the genus *Chloothamnus* was described by BUSE in the year 1854, it was not inserted in „Die natürlichen Pflanzenfamilien” by ENGLER and PRANTL, where the family of the Gramineae as worked out by Prof. E. HACKEL. Indeed, HACKEL, who had at that time no access to BUSE’s material, could only accept the facts found in the literature of the subject and therefore mentioned BUSE’s genus under *Schizostachyum*, considering it as belonging to that genus according to KURZ and having drooping spikelets. All the authors who had to do with BUSE’s genus tried to identify it only with the description given by BUSE, however, without consulting the beautiful type material of the author, preserved in the Rijksherbarium at Leiden. But even from the description, an excellent one, it is impossible to place *Chloothamnus* under the genus *Schizostachyum* as KURZ proposed. Since the new genus of BUSE is a very characteristic one with one interesting species, I wish to deal with this plant here more in detail after a careful study of the type material and the literature of the subject. For that purpose it is necessary to give BUSE’s descriptions *in extenso* to point out why so many authors had so different and wrong ideas concerning this plant. Furthermore I can give some new characters of the genus and, after reexamination of all the characters of the spikelets, explain some points of the terminology, used by BUSE. The description by this author runs as follows:

Chloothamnus. Paniculae parvae paucirameae fere omnium ramorum sunt termini. Spiculae pedicellatae lanceolatae, subbiquiflorae, floribus 4 inferioribus ad glumellam inferam redactis. Glumae adhuc distinguendae, parvae, acutae. Glumellae inferae superiora versus sensim fiunt majores, omnes coriaceae. Glumella supra tantum in flore supremo, unice absoluto. Lodiculae 3 pentagonales, marginibus conduplicatis apice longe ciliatis. Stamina 6. Stylus subnullus, stigmata 3 germini insident lagenaeformi. Caryopsis.....

Chloothamnus chilianthus Buse. Gramen exelsum, perelegans, habitu *Chusquea* non absimile, at sui generis, hexandrum, tristigmaticum.

Habitat insulam *Sumatrae*, in provinciae *Angkolae superioris* sylvis, altit. 1—3000' JUNGH.

Rami mihi prostant septempedales iique forsan laterales. Sunt glabri, striati, ianes. Nodi parum crassi. Ramuli infra seni aut quini, supra minori numero, nunc fasciculatim nunc veluti verticillo undique prorumpentes, bracteis pluribus interjectis et subjectis. Folia parva, tenuia, saltem in ramis florentibus, supra glaucescentia, infra glauca, glabra, margine minute denticulata, nervo medio in inferiore tantum pagina conspicuo, nervis lateralibus primariis utrinque 3—5, transversalibus conspicuis. Vaginae more solito auriculatae, setosae, ligula abbreviata. Ramuli fere omnes panicula terminati, basi folii supremi vagina vaginati, protracta solutave vagina; panicula rarissime videtur lateralis. Rachis applanata, acutangula, brevis, ramos gerit paucos simplices vel in ramulos subternos iterum divisos. Spiculae cernuae, secundae, 6—24 ad plurimum in panicula, plerumque simplices, sed et aliquando gemmula minuta basi auctae occurrunt, normaliter absolutae, sed etiam more *Bambusacearum* solenni magis minusve evolutae. Glumae glabrae, acutae, carinatae, infera brevior. Glumellae inferae glabrae, nervis prominulis; glumella supera, quae tantum florem absolvit unicum superiorum, margine involuta, apice pilosa, nervis vix prominentibus.

From this description we see that BUSE's plant cannot belong to the genus *Schizostachyum* on account of the utterly different inflorescence which has, as BUSE correctly indicated, the habit of that of the genus *Chusquea*, the latter, however, being confined to South America. Important are the lodicules in BUSE's species, which are wanting in the genus *Schizostachyum*. By studying the spikelets of BUSE's type we learn somewhat more about his concept of the organisation of the spikelets. These spikelets have two lower short scales, representing the two glumes as generally found in the grasses; BUSE too calls them glumae. The next scales, gradually becoming larger, are also sterile, having no trace of flowers in their axils, in reality there are 4 of such scales in nearly all the spikelets I examined. BUSE gives 4 of such glumellae but mentions the spikelets as „subquinqueflorae”. If we carefully remove the sterile scales, we have a rhachis with the only flower of the spikelet at the top, under a high power we see that the continuation of the rhachis is not extant, laterally we see at the end of the rhachis

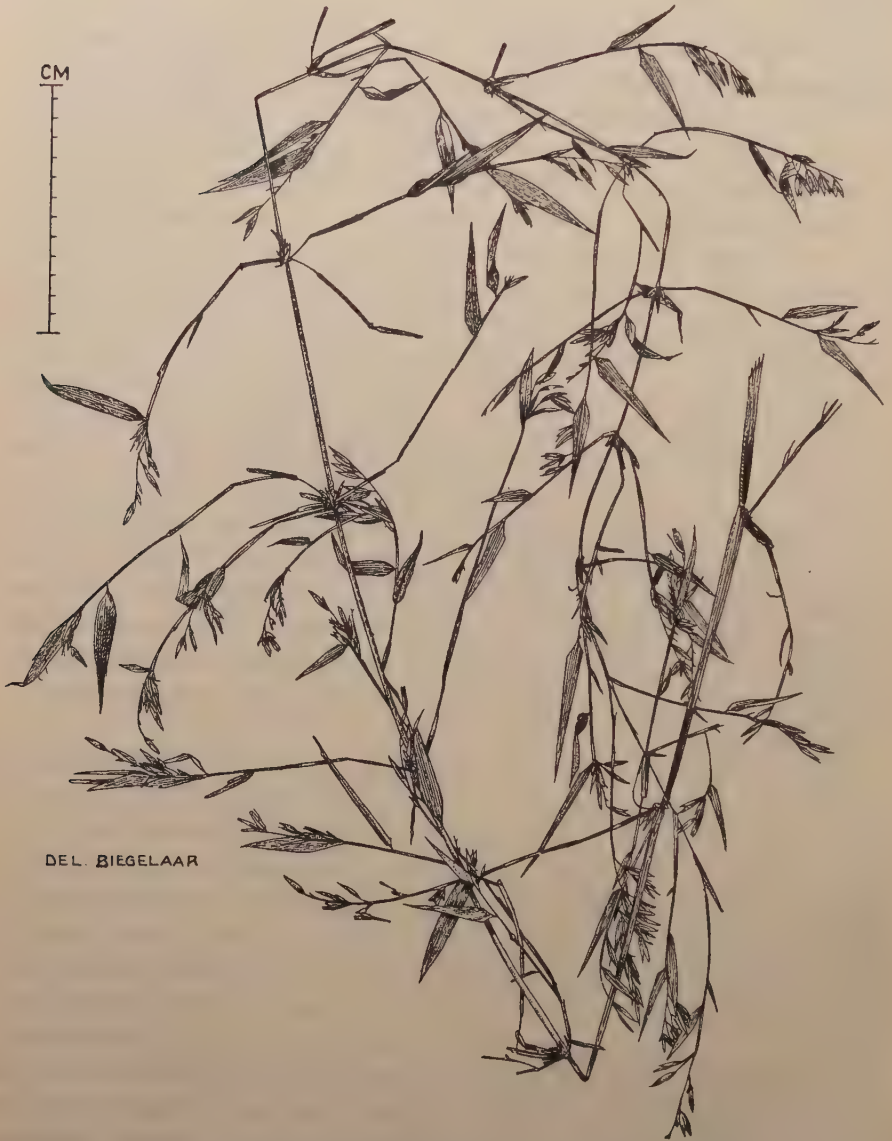
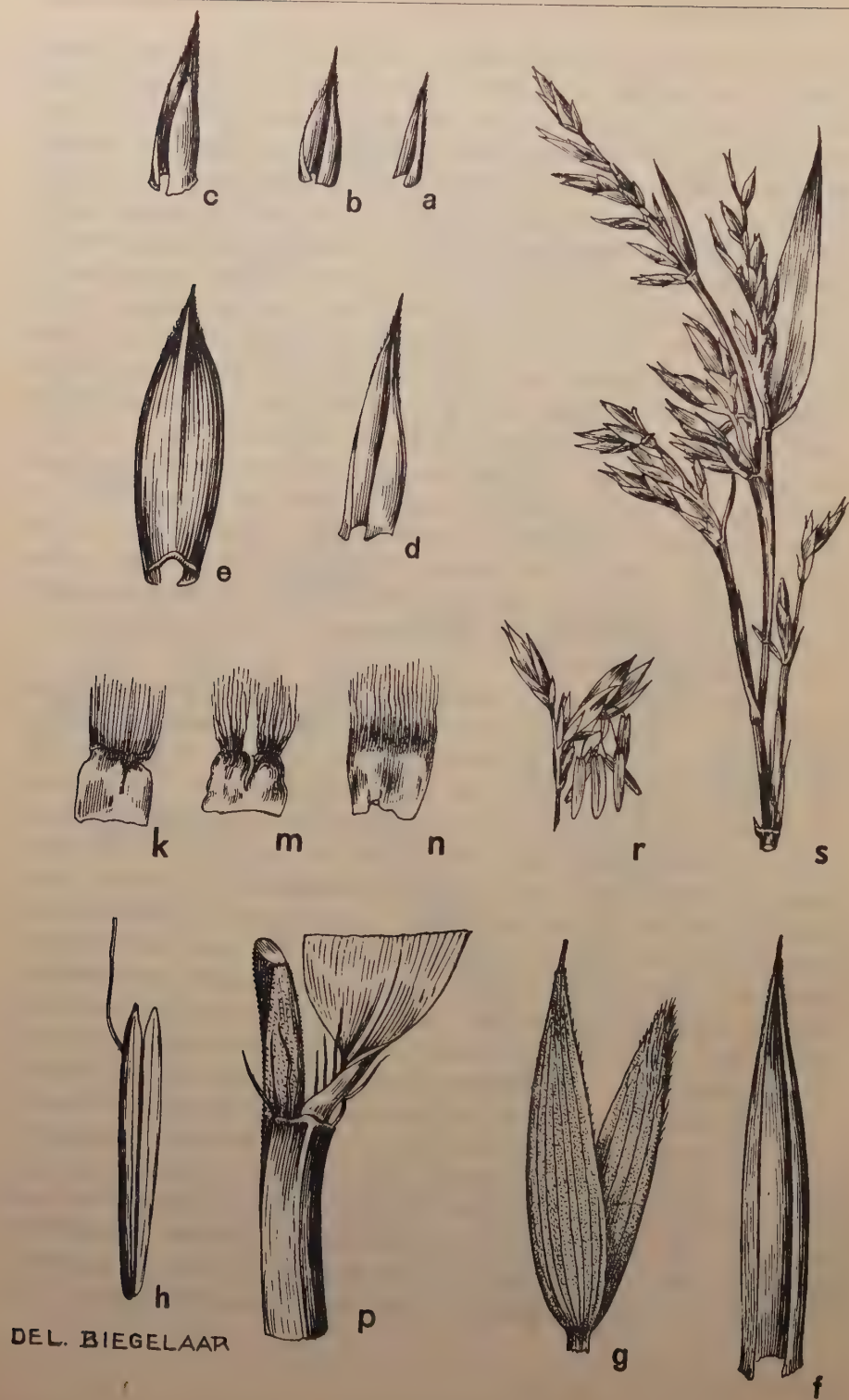


Fig. 1 — *Chloothamnus chilianthus* BUSE — From type specimen.

only a very minute conical elevation which is often scarcely visible. This is a very important character because in the genus *Schizostachyum* there is a rather long and very distinct prolongation of the rhachis which not rarely bears a small rudiment of a glume. Another important point of difference is that the spikelet of *Schizostachyum* is in reality a small inflorescence, the rhachis being branched from the sterile scales; such spikelets are therefore indicated as pseudo-spikelets, whereas in *Chloothamnus* the spikelets do not differ from typical grass-spikelets, with the exception of the lower scales which bear no flowers. If we now look at the flower at the top of the rhachis, we find that it consists of a fertile lemma having the aspect of the sterile ones and a palea; the latter is slightly shorter than its fertile lemma and differs from the common palea as found in grasses in being of quite the same form and structure as the fertile lemma and in being not provided with two keels. In *Schizostachyum* the palea is keeled and sulcate, and the sulcus is occupied by the slender prolongation of the rhachis. All the characters enumerated above are so different from those of the genus *Schizostachyum* that it is evident that BUSE's genus *Chloothamnus* cannot be united with the genus *Schizostachyum*. I suppose, this question is now definitively settled.

We now come to the question: what have later authors done with BUSE's genus? First of all we go to Colonel MUNRO's monograph of the *Bambusaceae* from the year 1866 and find there that he too did not see the plant of BUSE. Under the genus *Nastus* he gives as the distribution also Sumatra with a ? and says further on: „I am not acquainted „with *Chloothamnus* of BUSE, except from the description of the genus „given by MIQUEL, and, with the sole exception of no mention being „made of the terminal barren pedicel, I cannot discover any difference „between it and *Nastus*.” MUNRO further cites JUNGHUHN's locality under the distribution of *Nastus borbonicus* GMELIN, which was described from the island of Bourbon and is growing there at an altitude of 3000 to 4000 feet. „This *Nastus borbonicus* is a most beautiful grass, flowering „in September and October, when the stamens are exerted and hanging „from the spiculae. It is quite an alpine plant, and forms a well-marked „and remarkable belt all around the island of Bourbon, interrupted „only in places where the flow of lava prevents vegetation.” (p. 75). MUNRO remarked that it is very interesting that a plant which was supposed to be confined to a very considerable elevation (3000—4000 feet above the sea) in Bourbon, should also be found in Sumatra, probably in a similar volcanic district (but at lower altitudes). Now



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I saw and studied authentic material of this *Nastus borbonicus* and it is very striking to see how much it resembles the *Chloothamnus* of Sumatra in habit, having the same whorled floriferous branches, with the subsecund drooping spikelets which have the same form as those of BUSE's plant. *Nastus borbonicus*, however, differs distinctly in the hairy sheaths and glumes and especially in the palea of the flower which is sulcate with two keels and a prolongation of the rhachis which is placed exactly in the sulcus. MUNRO's identification is better to understand than KURZ's one and proves that the carefully studied BUSE's description. On account, however, of the prolonged rhachis and the sulcate, two-keeled palea of the genus *Nastus* we cannot unite *Chloothamnus* with *Nastus* although the two genera at first sight seem to be the same. We have here once more a striking convergency which is known in different other families, e. g. *Evolvulus* and *Jacquemontia* in the *Convolvulaceae*.

Colonel MUNRO described in his monograph also *Melocanna gracilis* KURZ, a name taken from a manuscript note, the type being WALLICH no. 5032. From the authentic description it is clear that this plant does not belong to the genus *Chloothamnus* because the palea is two-keeled and sulcate.

In the year 1870 S. KURZ, the curator of the Calcutta Herbarium, wrote an article on some new or imperfectly known Indian plants in the Journal of the Asiatic Society of Bengal. Here different bamboos are dealt with and we find there under no. 95 (p. 88) his opinion, that *Melocanna gracilis* KURZ, apud MUNRO, is *Schizostachyum chilanthum*, (*Chloothamnus chilanthus* BUSE). The difference between *Melocanna* and *Schizostachyum* rests entirely in the fruit, and not in the absence of the upper palea, as suggested by Col. MUNRO.

This identification, although being wrong, as we know at present, by such an authority as KURZ was accepted in the Index Kewensis and since that time the genus of BUSE was lost. Unfortunately the misidentification of KURZ, was not discovered by J. S. GAMBLE when he published his great work on the Bambuseae of British India in the Annals of the Royal Botanic Garden, Calcutta in 1896. Here the name *Schizostachyum chilanthum* KURZ was accepted for a plant which was

Fig. 2 — *Chloothamnus chilanthus* BUSE — *a*, *b*, *c*, glume I, II and III ($\times 5$); *d* gl. IV ($\times 5$); *e* gl. V ($\times 4$); *f* gl. VI ($\times 5$); *g* flower with fertile lemma and palea ($\times 5$); *h* stamen ($\times 6$); *k*, *m*, *n*, lodicules ($\times 6$); *p* sheath with portion of the blade ($\times 3$); *r* group of spikelets, one of them with exserted stamens (about nat. size); *s* flowering branch ($\times 1$) — From type specimen.

figured on plate no. 101 from a specimen, collected at Batang, Malacca, by VAUGHAN STEVENS (no. 3947). A glance at the plate and a study of the description proves that GAMBLE described a plant which is very different from the true *Chloothamnus* of BUSE. GAMBLE says: „I have „followed KURZ in identifying his *Melocanna gracilis* with *Chloothamnus „chilianthus*, BUSE, although BUSE's description does not agree in all „particulars. (See also note in BENTH. and HOOKER FIL. Genera Planta- „rum, p. 1214.).”

Another important publication was given by BUSE himself three years after the publication of his new genus. He studied the grasses collected by Prof. REINWARDT and found among them a bamboo named by REINWARDT as *Bambusa tenuis* in his herbarium. He recognized this bamboo as belonging to his genus *Chloothamnus* and described it as a variety *subscraba* of his *Chloothamnus chilianthus* in *Plantae Indiae Batavae Orientalis*, published by Prof. DE VRIESE in the year 1857. In this publication we find on p. 114 under the tribus *Bambusacea* the following notes by BUSE:

Chloothamnus chilianthus Buse var. *subscraba* Buse: spiculis erectis, glumis glumellisque subscabris.

Hab. Collegit in Java, sub nomine *Bambusae tenuis*, Rwdt. Speciem ipsam in Sumatra Jungh. l. l.

It is important to give here further BUSE's opinion on this plant, saying:

Unum tantum in herb. specimen idque tamen absque dubio non nisi varietatis titulo a speciminibus Junghuhnianis discrepans. Glabrities enim aut scabrities in *Bambusaceis* non magni momenti est; pendetque saepius a vegeta aut laxiore speciminis indole, quam ob causam et spicularum directio, quod nempe sint erectae aut cernuae, variat; simile quid praebent *Bromi* nonnullae species.

Now the type of this variety was preserved in BUSE's own herbarium, which after BUSE's death was presented by the heirs to the Rijks-herbarium. This specimen I carefully studied. Unfortunately it is not in a good condition. It consists of a branch, about 40 cm long, with whorled flowering-branches; most of the spikelets are fallen off, the spikelets so far as present are more or less damaged and only one flowering-branch bears a part of a leaf. The sheet bears in ink a label by REINWARDT with the name in his handwriting as *Bambusa verticillata*, the name *verticillata* deleted and replaced by the name *tenuis*. There is another label reading „arborea inermis” and something illegible in lead pencil. There is, moreover, BUSE's label in his hand with the data

as given in his description. On this authentic specimen, I studied the characters of the spikelets and I compared them with those of the type of *Chloothamnus chilianthus*. Quite as in the true *Chloothamnus*, there are two small lower glumes followed by four longer sterile glumes, gradually becoming longer, there is a very minute prolongation of the rachis and but one flower, consisting of a fertile lemma and a palea of the same form and texture, there are six free stamens and 3 longiciliate lodicules and the stigmas are feathery. In this organisation there are no differences between the plants from Sumatra and Java. The javanese specimen has spikelets in which the various glumes are somewhat longer but their length in the Sumatra plant is variable too. In the javanese specimen the spikelets seem to be erect, in reality they are subsecund and BUSE himself did not attach much importance to this character. As to the indumentum of the spikelets I must remark that the true *Chloothamnus* from Sumatra has not rarely a fertile lemma which is scabrous.

From all the data we now have at the moment from the two types it is obvious that the variety *subscabra* is scarcely to maintain so that the genus *Chloothamnus* occurs not only in Sumatra but also in Java. The dimensions of the spikelets of the species are in general: gl. I $2\frac{1}{2}$ —3 mm, gl. II $3\frac{1}{2}$ —5 mm, gl. III $4\frac{1}{2}$ —5 mm, gl. IV about $7\frac{1}{2}$ mm, gl. V about 10 mm, gl. VI about 12 mm, fertile lemma about 12 mm, palea at least $10\frac{1}{2}$ mm, or in the javanese plant up to 11 mm long. In the type of the javanese plant the lemma is always much damaged, the tip broken off and the awn therefore never extant. The exact locality where REINWARDT collected his bamboo is unfortunately not known. I have no doubt that this locality is situated in Java indeed and I presumed that the same species was also represented in JUNGHUHN's collection. As the latter, however, does not contain but sterile specimens, BUSE failed to recognize it. Accordingly, I went over the sterile specimens of bamboos in BUSE's collection. We know that BUSE in the year 1854 under the grasses, at the end of the family, gave an „Addenda ad Bambusaceas”, where he treated the „stirpes steriles”.

We find there 7 sterile bamboos, all collected by JUNGHUHN. It was especially the 7th species that called my attention. BUSE gives the following characters:

ramis praelongis; ramulis verticillatis, flexuosis, plurimis; foliis parvis, lanceolatis, basi attenuatis, petiolo longiuseculo suffultis, utraque pagina laevibus, margine asperulis, tenue membranaceis, nervis non valde conspicuis.

Habitat *Javae* sylvas intactas prope *Pekalongan*, altit. 3—6000'. JUNGH. Incolae hanc vocant *Bambu oö*, fide JUNGH. — Species propria, scandens aut ramis pendentibus?

This plant is represented at the Rijksherbarium, with the label in BUSE's hand (H. L. B. no. 909, 65—112). There is another sheet with a label, probably written by JUNGHUHN himself and reading: „143 bambu ö ö Bosschen van Pegalongang¹⁾ 4300' Preanger". (H. L. B. no. 909, 65—36).

These sterile plants (branches), especially the first-named one, have, in their verticillate arrangement, the same habit as the flowering-branches of BUSE's *Chloothamnus* and the younger leaves are not different from those of the fertile shoots of BUSE's species; petioles, auricles and ciliae agree also.

The genus *Chloothamnus* is now better established and very distinct from all the other genera known at that time. It belongs to the *Eubambusea* and is to place near *Bambusa* on account of the free stamens but it is quite distinct in the not two- but one-keeled palea. As to the palea the genus *Chloothamnus* comes nearer to the genus *Oxytenanthera* where the palea is also but one-keeled, the latter has, however, many other differences and is at once to exclude by the monadelphous stamens and the conical, narrow spikelets. In the type of the genus *Chloothamnus* the sterile scales of the spikelets are acute if seen laterally, expanded they are rounded at the top and bearing a distinct mucro or short awn. These scales are many-nerved, the number of the nerves being 9—13. The spikelets, seen *in toto*, are somewhat flattened on account of the keeled glumes, the latter are nearly smooth, whereas the fertile glume (lemma) and the palea are, under a high power, very distinctly punctulate and have moreover below the tips, a characteristic adpressed indument, consisting of straight very stiff rather thick hairs. The leaves in this genus are tessellate by transverse veinlets, very distinct when dry.

MIQUEL, KURZ and HASSKARL were acquainted with this interesting bamboo; having only sterile specimens, they did not recognize the species, because they failed to look for the plant from Sumatra. In my opinion, HASSKARL described the same plant under the name of *Bambusa elegantissima* in the year 1848 whereas KURZ placed this plant of HASSKARL under other genera such as *Beesha*, *Melocanna* and *Schizostachyum*, opinions which are altogether incorrect.

The incertitude whether the javanese bamboo, treated here, repre-

¹⁾ = Pengalengan.

sented a distinct genus or a member of an already described one, was at once removed when the javanese bamboo was found in flower. This occurred, according to the labels of the specimens, kindly put at my disposal by the Herbarium at Buitenzorg, in the year 1903 or 1904. The very beautiful material, which is now represented in all the larger herbaria of the world, was collected by BOSSCHA near Malabar in Priangan (the type locality of *Bambusa elegantissima* of HASSKARL, as is evident from his description in the year 1848, where he cited his species as growing „In sylvis 4000 ped. elatis inter montes Tilu et Malabar provinciae Bandong in terra Preangereana copiosissime obviam venit; nom. sund.: A'wi ülül.”)

These specimens from BOSSCHA were studied by VALETON and determined by him as *Schizostachyum elegantissimum* KURZ in the year 1905, a combination which is based upon HASSKARL's *Bambusa*, mentioned above. The exact locality of JUNGHUHN's plant is according to his label, in the Preanger at 4300 feet near Pengalengan (written by JUNGHUHN as Pegalongang). BOSSCHA's specimens belong to the genus *Chloothamnus*. The identification of VALETON was quite correct, but unfortunately he followed KURZ and placed the species in the wrong genus. Now the question was definitively settled when Prof. PULLE found the species in flower in the year 1906 near the high plateau of Pengalengan at 1600 m altitude near Malabar too. These flowering specimens had reduced leaves only, they agree perfectly with BOSSCHA's plants. It was KOORDERS who communicated a specimen of Prof. PULLE's no. 3173 to J. S. GAMBLE, the monographer of the Indian *Bambusaceae*, who recognized the plant as belonging to a new genus named by him *Oreiostachys* with the species *O. Pullei* GAMBLE. A publication of this genus appeared in *Verhand. Kon. Acad. v. Wetenschappen* at Amsterdam Deel XVI, ii, p. 657 in the year 1908. This description was prepared from the flowering specimen of PULLE and from the sterile specimen of JUNGHUHN no. 143.

This new genus with one species agrees as to the description and the type specimen perfectly with all the other specimens hitherto found in Java and belongs at the same time to the genus *Chloothamnus* of BUSE. KOORDERS gives in his article much information about the genus *Oreiostachys*, noting that it is more related to the genus *Sasa*, which was published by MAKINO and SHIBATA in the year 1901, a genus having 6 stamens with free filaments and 3 plumose stigmas, the leaves being finely tessellate. In *Sasa*, however, there is a distinctly bicarinate palea, moreover all the flowers of the spikelet are perfect with an imperfect

terminal one. *Sasa* is a Japanese genus of shrubby bamboos. KOORDERS gives much other information as to the geographical distribution, but the genus is as we know at present not endemic in Java; it occurs not only in Sumatra but also in New Guinea. Having found the identity of the genera *Chloothamnus* and *Oreiostrachys* we have to accept for the Japanese plant the name *Chloothamnus elegantissimus* (HASSK.) HENR. nov. comb.. I have to add here that VALETON, according to determinations given by him in the Herbarium at Buitenzorg, gave to the plant the name of *Oreiostrachys elegantissimus* (HASSK.) VAL. a name also accepted by BACKER in his Handb. Fl. Java (1928) p. 288.

In an additional paper by KOORDERS in Verh. Kon. Acad. Amsterdam, Deel XVII (1909) p. 127 on *Oreiostrachys* we find some more data as to the fruit of the genus. I have in vain tried to find mature fruits in the rich material I had at my disposal, material kindly received for study from Kew and Buitenzorg. In our herbarium there is on the sheet of the specimen collected by BOSSCHA an envelope with fruits, as indicated in VALETON's hand, in reality these are no fruits but much swollen spikelets, infected by a gall, which is not rarely observed on the plant. Fine cigargalls were also found on the specimens which SCHEFFER already collected in the year 1871.

There is one point more I wish to memorate; GAMBLE, who recognized the genus, accepted the name *Bambusa elegantissima* HASSK. as a nomen nudum. Although HASSKARL's Latin description is short and taken only from sterile material, the exactly given type locality points to no other bamboo and his name has therefore priority even over BUSE's name *chilianthum*. As to the identity of the plant from Java and that from Sumatra I must remark that only the Japanese species is fully known in its vegetative and flowering parts. Unfortunately, the plant from Sumatra, although represented in very beautiful flowering material, is not known with the normal leaves in the vegetative state and there are, moreover, some slight differences, the bamboo from Sumatra being a more graceful and elegant plant and the short pubescence of the leaves just above the petiole on the lower surface, so distinct in the Japanese plant, is scarcely visible in the bamboo from Sumatra. In the spikelet-characters there are, as is already pointed out, no specific differences.

For the moment I did not place BUSE's material in the Rijks-herbarium under *Chloothamnus elegantissimus*; it seems to me that it is better to wait until the bamboo from Sumatra is fully known in its vegetative parts. The Kew Index accepts *Oreiostrachys* as feminine and gives the specific name as *elegantissima*.

In modern time different other bamboos were described and placed in the genus *Oreiostrachys*. Of course, if they indeed belong to that genus, they ought to be transferred to the genus *Chloothamnus*. I hope to give more information about this subject afterwards and place here another species under the genus *Chloothamnus*.

Chloothamnus Schlechteri (PILGER) HENR. nov. comb. = *Oreiostrachys Schlechteri* PILGER in Engler, Bot. Jahrb. Band 52 (1914) p. 174.

The very good description points exactly to the genus *Oreiostrachys* as already observed by PILGER in a note. This species is very characteristic by the long-awned glumes of the spikelets.

Oreiostrachys producta PILGER in ENGLER, Bot. Jahrb. Band 62 (1929) p. 460 is a very aberrant species; it has a prolongation of the rachis with a rudiment at the summit, this prolongation is about 7 mm long and the palea is two-keeled, the prolongation being imbedded in the sulcus. PILGER noted already these facts but accepted his new species as allied to *O. Pullei* and *O. Schlechteri*. The species is however insufficiently known and PILGER thinks that this plant may be a small bamboo. For the moment I therefore hesitate to place *Oreiostrachys producta* under the genus *Chloothamnus*.

Oreiostrachys ciliata (CAMUS) NAKAI in Journal Arnold Arboretum. VI. (1925) p. 152 = *Arundinaria ciliata* CAMUS in Bull. Mus. Nat. Hist. Paris XXV (1919) p. 672.

NAKAI's description of the genus is different from the original one and does not agree with the type of the genus. He mentions only a few characters, two styles having no plumose stigmas, the obtuse glumes do not agree with the true *Oreiostrachys*. The name was based upon a bamboo from Cambodja, collected by PIERRE. From the description given by Miss CAMUS it is, in my opinion, evident that this species is not an *Oreiostrachys* at all. The very long, many-flowered spikelets and the implicate ciliolate keels of the palea demonstrate this. *Arundinaria ciliata* is moreover a not climbing bamboo.

The localities (Priangan, W. Java) of the *Chloothamnus elegantissimus* specimens are extensively cited in the Excursionsflora von Java by KOORDERS. I have to add here the following:

W. J a v a : Priangan Regencius: Bandoeng; Tjibeureum, leg. J. J. Smith no. 636, 20 IX 1911, sterile, 1600 m (Herb. Buitenzorg) — G. Goentoer, ravine of the Tjiboenilarang near Kamodjais, leg. B. H. Danser no. 6744, 30 V 1928, flowering, circa 1400 m (Herb. Buitenzorg, Herb. Leiden).

In the present paper I have given the name of the author of the

genus *Chloothamnus* as BUSE. In the first article of BUSE the name was published by MIQUEL as *Büse* with the new species of that author, but his article on the Gramineae was followed by the words: „exposuit L. H. Buse”. The author himself always wrote his name and signed his labels in his herbarium as *Buse*. Afterwards when he wrote a second paper on grasses, published by DE VRIESE in 1856, his name was constantly, throughout the whole paper, given as *Buse*. The spellings *Büse* or *Buese* found in the literature are therefore wrong.

My sincere thanks are due to the curators of the herbaria at *Buitenzorg* and at *Kew* for the kindness, with which they have put the material of this genus at our disposal.

Summary.

Chloothamnus BUSE ap. MIQUEL, Pl. Jungh. 1854, 386 — *Oreio-stachys* GAMBLE ap. KOORDERS, Verh. Kon. Ak. Wet. **16**, 1908, 657..

Hab.: Malay Archipelago.

1. **C. chilianthus** BUSE, l. c., type species of the genus — *Schizostachyum chilianthum* (BUSE) KURZ, Journ. As. Soc. Beng. **39**, ii, 1870, 88 — *non Melocanna gracilis* KURZ ap. MUNRO, Transact. Linn. Soc. **26**, 1866, *nec Schizostachyum chilianthum* in GAMBLE, Ann. Roy. Bot. Gard. Calc. **7**, 1896, 116, pl. 101.

Hab.: Sumatra (Angkola 300—900 m).

2. **C. elegantissimus** (HASSK.) HENR., nov. comb. — *Bambusa elegantissima* HASSK., Pl. jav. rar. 1848, 42 — *Beesha elegantissima* (HASSK.) KURZ ap. MUNRO, l. c. 1866 — *Schizostachyum elegantissimum* (HASSK.) KURZ, l. c. 1870, 90.

Hab.: W. Java (Preanger, 1500—1600 m).

Remark: Possibly identic with the preceding species.

3. **C. Schlechteri** (PILG.) HENR., nov. comb. — *Oreio-stachys Schlechteri* PILG., Engl. Bot. Jahrb. **52**, 1914, 74.

Hab.: N.E. New Guinea (Dischore, 1300 m).

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1925 — NAKAI, T. Two new genera of Bambusaceae. Journal of the Arnold Arboretum, Vol. VI, p. 152.
1928 — BACKER, C. A. Handboek voor de Flora van Java, Afl. 2, p. 287.
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CONTRIBUTIONS TO THE HISTORY OF BOTANICAL SCIENCE.

Although this journal is more particularly destined to contain the results of taxonomical and geographical studies, it may sometimes provide accommodation for subjects of a different, though kindred nature. The more so, when an item is concerned, which is, in some way or another, closely allied to the editing institution.

The apparently long-forgotten XVth Century MS., rediscovered in the library of the Rijksherbarium, is therefore a worthy subject for a series of papers under the general title proposed above. It has been carefully transposed into modern type, as may appear from the quotations given. Both the entire rewritten MS. and the original may be consulted in the Rijksherbarium and I avail myself of this opportunity to request the interest and, if possible, the cooperation of anyone, who may know something to solve the problem of its origin.

As has been mentioned in the introduction, the first 35 pages as well as the title are wanting. It may be suggested, that this part is preserved in some other library, though it not necessarily needs to be dealing with the same subject. Anyhow, we would be greatly obliged, if we could be informed as to the lacking part.

The MS. was shown to Prof. H. P. BLOK, MS. keeper of the University Library (cf. text below), to Dr. F. W. T. HUNGER, the well-known connoisseur of herbals and botanical MSS. and to Dr. P. C. MOLHUYSSEN, director of the "Koninklijke Bibliotheek" at The Hague. Neither of these gentlemen could identify the MS. with any book known to them. I am pleased to tender them my best thanks for the kind interest they took in the matter.

The MS. collection of the University Library of Leiden does not contain anything which could be considered as the part wanting. However, it is possible that the MS. hails from the collection of VOSSIUS, the greater part of which is preserved at Leiden, being originally a private collection of Queen Christina of Sweden (cf. Catalogue of the so-called MSS. Chymici Vossiani, by GRONOVIVS, 1716, p. 359 s.s.).

Any information on the matter will therefore be greatly appreciated.

It may be added that Dr. LUTJEHARMS and Dr. VAN OOSTSTROOM intend to deliver some more contributions to the series started herewith. The Rijksherbarium owns some old herbaria, which deserve to be more universally known, such as a herbarium, ascribed to BOERHAAVE, the magnificent herbarium of RAUWOLFF (\pm 1575), the Ceylon herbarium of P. HERMANN, the *Plantae rariores Borussiacae et Cassubicae* of BREYNE and a herbarium presumably also collected by BREYNE in the neighbourhood of Danzig.

The Editor of "Blumea".

I.

ÜBER EINE BOTANISCHE HANDSCHRIFT AUS DEM
15. JAHRHUNDERT

von

W. J. LÜTJEHARMS und S. J. VAN OOSTSTROOM

(Leiden).

Mit einer Figur und zwei Tafeln.

Im Laufe des Jahres 1935 wurde von uns in der Bibliothek des Reichsherbariums in Leiden eine alte botanische Handschrift gefunden, welche wir ihrer grösstenteils sehr guten Wasserfarbenzeichnungen wegen, hier einer näheren Besprechung unterziehen wollen.

Das Manuskript, das wahrscheinlich ursprünglich mit einer Einbanddecke versehen war, wurde lose in einem nicht hinzugehörigen Pergamentband aus dem 18. Jahrhundert angetroffen. Es besteht aus 87 Blättern, numeriert von 36 bis zu 123 einschliesslich; fol. 98 fehlt. Die Höhe der Blätter beträgt 29.2, die Breite 21.2 cm. Das erste Blatt, fol. 36 (r), enthält die Bemerkung: Mstum Botan. Saec. XV, und ist weiter mit einem aufgeklebten Zettel versehen, welcher vermutlich die Unterzeichnung SCHRANK trägt, und in dem dieser mitteilt, dass es hier eine Handschrift betreffe, die aus dem Nachlass eines bestimmten GLACIUS herrühre. Weiter haben wir betreffs der Herkunft des Manuskripts und der Weise wie das Reichsherbarium es erworben hat, leider nichts ermitteln können.

Aus einer Untersuchung der Wasserzeichen im Papier stellte sich heraus, dass davon sechs verschiedene anwesend sind (Fig. 1, *a—f*). In vielen Fällen kommt ein Kuhkopf mit einer Blume vor, in drei verschiedenen Variationen. Auch ein Dreieck mit Kreuz ist oft anwesend während ein Turm und ein gothischer Buchstabe P, an der Obenseite mit einer vierblättrigen Blume versehen, beide nur einmal vorkommen.

Vergleichen wir diese Wasserzeichen mit denen, welche von BRIQUET (1) abgebildet wurden, so sehen wir, dass der Kuhkopf in fol. 41, 45, 46 und 47 (Fig. 1, *a*) eine ziemlich grosse Uebereinstimmung mit Abb. 14847 dieses Verfassers zeigt (*tête de boeuf sommée d'une fleur portée par un trait ou par une tige*). Auch das pfeilähnliche

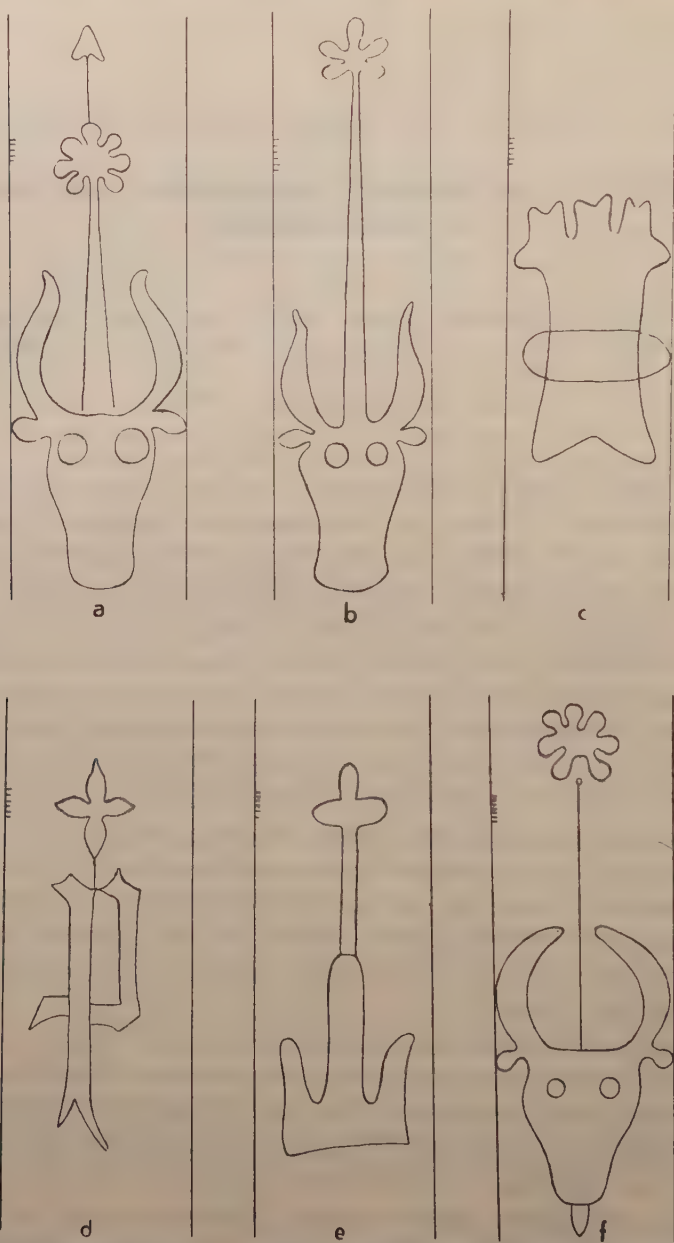


Fig. 1. Wasserzeichen. *a.* in fol. 47; *b.* in fol. 42; *c.* in fol. 48; *d.* in fol. 49; *e.* in fol. 50; *f.* in fol. 63.

Gebilde über der Blume kommt in beiden vor. In fol. 42 (Fig. 1, *b*) und einigen anderen (fol. 63—65, 67, 69, 73, 87, 89, 91, 97, 100, 105,

107 und 108) tritt der Kuhkopf wieder auf, in diesen Fällen jedoch ohne den Pfeil, wohl aber mit der Blume. Den Dreiberg mit Kreuz (Fig. 1, e) finden wir in fol. 50, 52—54, 56, 60, 76, 80—82, 84, 85, 99, 112, 114, 117, 119, 120 und 122 und derselbe stimmt fast völlig überein mit BRIQUET's Abbildungen 11789 und 11790, besonders mit der erstgenannten (trois monts surmontés d'une tige à double trait, portant une croix blanche); der Turm (fol. 48; Fig. 1, c) ist denjenigen, die BRIQUET unter den Nummern 15873, 15875 und 15876 abbildet sehr ähnlich und schliesslich sind das gothische P mit der vierblättrigen Blume (fol. 49; Fig. 1, d) und BRIQUET's Abb. 8595 (lettre P gothique à fleuron à quatre feuilles) sich fast völlig gleich.

Fragen wir uns nun aus welchen Jahren diese bei BRIQUET abgebildeten Wasserzeichen stammen, so ergibt es sich, dass sie alle in Papier vorkommen, das zwischen den Jahren 1464 und 1491 verwendet wurde, also in der zweiten Hälfte des 15. Jahrhunderts. Dies stimmt also gut überein mit der Angabe auf dem ersten Blatte der Handschrift.

Weiter hatte Prof. Dr. H. P. BLOK, der Konservator der Handschriftensammlung der Universitätsbibliothek in Leiden, die Liebenswürdigkeit das Manuskript zu untersuchen. Er gelangte zu dem Resultat, dass auch die Schrift des Manuskripts aus der zweiten Hälfte des 15. (oder aus der ersten Hälfte des 16.) Jahrhunderts stammt.

Wir haben also jetzt drei Angaben, die völlig mit einander übereinstimmen in der Feststellung der Zeit der Herstellung des Manuskripts, sodass wir wohl annehmen können, dass es wirklich aus dem 15. Jahrhundert herrührt.

Was nun die Abbildungen und der dazu gehörige Text des Manuskripts anbetrifft die folgenden Bemerkungen; vgl. Taf. 2. Die abgebildeten Pflanzen sind im allgemeinen sehr gut zu erkennen, die Farbe ist bei der Mehrzahl der Pflanzen sehr natürlich wiedergegeben worden und ist sehr gut erhalten. Die Zeichnungen machen den Eindruck nach der Natur angefertigt zu sein, also nicht, wie so oft der Fall war, nach anderen Manuskripten und dergleichen kopiert zu sein, obwohl zugegeben werden muss, dass einige eine gewisse Aehnlichkeit mit Abbildungen des Hortus Sanitatis zeigen. Der weitaus grösste Teil unserer Zeichnungen ist sehr naturgetreu, und besitzt, wie SCHRANK schon auf dem Zettel auf fol. 36 (r) bemerkt, tatsächlich Vorzüge „die man solchen Gemahlden aus dem Zeitalter nicht zutrauen sollte“.

Die Mehrzahl der Tafeln trägt den Namen der abgebildeten Pflanze auf deutsch, in einigen Fällen sind auf der gegenüberstehenden Seite auch Synonyme hinzugefügt worden. Dies ist der Fall auf fol. 36 (v);

42 (v); 45 (v); 48 (v), diese gehören nicht zu 49 (r) sondern zu 50 (r); 50 (v); 51 (v); 52 (v); 54 (v); 56 (v), diese Synonyme sind mit anderer Hand geschrieben worden; 57 (v); 58 (v); 59 (v); 73 (v); 89 (v); 92 (v); 101 (v); 103 (v); 107 (v); 108 (v); 109 (v); 120 (v).

Vgl. Taf. 1 wo links die Synonyme, welche zum Beifusz, *Artemisia vulgaris* L. und rechts diejenigen, welche zur Bile, *Hyoscyamus niger* L. gehören, abgebildet sind, und weiter das Verzeichnis der Namen und der Synonymen am Ende dieser Veröffentlichung.

In den Anfangsbuchstaben der deutschen Namen und Synonymen ist oft mit rot eine ganz einfache Verzierung angebracht worden.

Es kommt uns vor, dass das Manuskript anfangs aus den Wasserfarbenzeichnungen, versehen mit den deutschen Namen und den Synonymen zusammengesetzt war, und dass der Text später hinzugefügt worden ist, bald auf derselben Seite wie die Abbildung, bald auf der gegenüberstehenden. In einigen Fällen ist kein Text hinzugefügt worden, nämlich auf fol. 41 (r) Druszkraut; 68 (r) ohne Namen; 78 (r) Eselszfusz; 83 (r) Bromber; 84 (r) Floramor; 87 (r) Ziegenbandt; 95 (r) Goltkraut; 111 (r) Awerhan.

Ausser den Nummern der Blätter von 36 bis 123, rechts oben, tragen einige Blätter noch mit anderer Hand das Wort „fol.“ mit einer Nummer versehen. Dies ist der Fall bei fol. 37 (r): fol. 2; 39 (r): fol. 26; 43 (r): fol. 3; 52 (r): fol. 6; 55 (r): fol. 8; 58 (r): fol. 11; 61 (r): fol. 11; 71 (r): fol. 5; 80 (r): fol. 20 und 97 (r): fol. 24. Es ist nicht klar worauf diese Angaben sich beziehen.

Weiter kommen bei einigen Abbildungen rechts oben, in unmittelbarer Nähe des Obenrandes noch Namen vor, mit sehr kleinen Buchstaben geschrieben, und zum Teil völlig unleserlich, auch wieder mit anderer Hand: auf fol. 62 (r): pilosella [?]; 63 (r): Tarassicon... dens leonis; 66 (r): epatica; 70 (r): fol. 18 columbinij...; 75 (r): Serpillu; 76 (r): mann...; 83 (r): unleserlich; 90 (r): scolopendr...; 102 (r): qnqe nervia [?]; 105 (r), 115 (r), 116 (r) und 120 (r): unleserlich, während auf den unten angegebenen Blättern später auch noch die folgenden Namen und Bemerkungen hinzugefügt worden sind. Auf fol. 39 (r): Sanicula; 51 (r): Bilsen; 54 (r): f..... muntz; 54 (v), bei den Synonymen: Bulegium, boleij; 56 (v): Synonymen mit anderer Hand, siehe p. 82; 59 (v): zu den Synonymen ist hinzugefügt: urtica; 62 (r) hinter Meuszore: als heylkraute; 65 (r): Edree Leberkraut, Waldtmeyster; 66 (r): Soleh Krauth in wein gethan/ wird nicht Saur; 71 (r) hinter Wegwart: wege Leuchttenis [?] oder Sonnenwirbell; 96 (r) hinter Walwurtz: als Schwartzwurtzel; 117 (r): hier fehlt der

Umco { Terostem
 Scamstellum
 Serpesiam
 Sarsileogiam
 Partemcon

apthe { apolissos
 artthemefiam
 Godesua
 Luoprasp
 Leantepum
 pethesie
 Omantis verga
 Cheomtis
 Ostantropu
 Emach rom
 Honore egestor
 Philaterion megant
 hubastat

Egyptu { Alfabalsa
 Litagoras sepaia
 Kobolus

Umco { prisanterius
 egyptu { then

romani { Camium
 Canagitan
 Canaripan

Greci { Vescramon
 Adamas
 Trosciamos
 Pythomon
 Antiamon
 Crisamon
 Chamboes
 Anginos
 Hemoritus
 Crimbion

pitagoas { Ofione
 Afiozelion
 Pumi vmtan

latini { Nusquam
 Appollmarem

Egyptu { Sastheo
 friges vinctema
 Alterculum
 Simphonica
 Calicularum
 Tentariam

Thusti { Afabalubma
 Galli { Belli mmtan
 Daci { Dietman
 apthe { Eppoptue lycea

Taf. 1. Links: Synonyme auf fol. 36 (v), bei Beyfusz, *Artemisia vulgaris* L.;
 rechts: Synonyme auf fol. 50 (v), bei Bylsen, *Hyoscyamus niger* L.

(Phot. J. P. M. BIEGELAAR).

ursprüngliche Namen und ist später hinzugefügt: Heydenisch Wundtkraut. Schliesslich finden sich auf fol. 67 (v), 99 (r) und 108 (v) noch einige, offenbar später hinzugefügte, Bibeltexte und religiöse Ergüsse.

Wie schon oben gesagt, ist uns, ausser der Bemerkung SCHRANK's über die Herkunft des Manuskripts nichts bekannt. Der Text zeigt grosse Uebereinstimmung mit LONICERUS' Kräuterbuch (3), das aber in der Ausgabe vom Jahre 1737, welche uns vorliegt, für die betreffenden Pflanzen ausführlicher ist als unsere Handschrift. Auch sind viele der angegebenen Verwendungsarten in dem Hortus Sanitatis zurückzufinden, was uns nicht wundern darf, weil doch LONICERUS, wie MEYER (4) bemerkt, zum Teil auf den Hortus zurückzuführen ist. Die meisten der im Manuskript vorkommenden Synonyme finden wir bei LONICERUS nicht. Diese Synonyme zeigen aber grosse Aehnlichkeit mit denen bei PSEUDO-APULEIUS, obwohl die Orthographie der Namen oft bedeutende Unterschiede aufweist, was aus einer Vergleichung mit HOWALD und SIGERIST's Ausgabe des PSEUDO-APULEIUS (2) hervorgeht. Für eine Vergleichung des Textes mit LONICERUS' Kräuterbuch sind zwei Seiten der Handschrift unten abgedruckt worden und schliesslich geben wir ein Verzeichnis der abgebildeten Pflanzen mit den deutschen Namen, wie sie im Manuskript vorkommen, samt den zurzeit gültigen lateinischen. Weiter sind in diesem Verzeichnis die Synonyme aufgenommen.

Beispiele des Textes der Handschrift.

51 (r):

Bylsen Kraut undt Sahmen ist kalter natur undt eigent schafft in den dritten Gradt/ vollkommen/ einer schadtlichen Gifftigen *qualität* machet tohl undt schlaffen/

Dieses Safft in die ohren gelaszen tödtet die wurme/ die wurtzel gesotten mit Eszig/ u: in den Mundt gehalten/ beniehmet das Zahnweh wer den Sahmen odter graudt iszet/ dem ist es ein giff/ Den Saamen gepulvert/ mit frauwen milch/ eijerweisz u: mit ein wenig Eszig vermischet u: an den Schlaff gestrichen/ macht wohl schlaffen/ Mit mehl uber das *poda/ gra* gelegt/ stilt es.

Beste Zeit undt Distelierung ist wurzel u: blumen/ umb S: *Johan Baptisten* tag gebrandt/

Bilsen Krautwaszer vertreib alle wehe tage des haubts/ so von hitz kompt/ dz haupt da/ mit bestrichen/ so mans an die stirn/ u: schlaaffe streichet/ machest wohl schlaffend

52 (r) :

Rawten

Ein guht *praeservativ* vor den Gifft/ nimb rautenbletter i loht/ feijgen ein $\frac{1}{2}$ loht/ wacholdter $i\frac{1}{2}$ loht/ welschnusz 2 loht/ rosen odter wein Eszig 4 loht/ stoszes durch ein andter/ nutze es morgens nuchtern/ ehe man an die lufft gehet/ ist sehr guht vor den gifft/

Rauten gesotten in Eszig/ den ge/ nutzt/ ist gut fur dz auffstoszen/ das hufft undt brustweh/ ist auch guht denen/ so einen kurtzen Adtem haben/ benimpt den Husten/ Heijlet das ge/ schwer aus der lunge/ darvon den entstehet die Schwindt sucht/.

Rauten blatter mit wein gekocht sambt den saahmen/ lindtert den husten/ undt das Keichen/ thut auff die lufft röhr der lungen/ undt sehr guht vor dz fieber. Rauten gesotten in waszer/ undt mit starcken wein gemischt/ vertreibet das Gurren im Bauch/ u: geschwulst undter den Ribben.

Die bletter abgestreiff von den stengel undt gebrandt mitten im Maijen. Disz $\overline{\vee}$ abenst u: morgens getruncken jedtes mahl auff zweij odter dreij loht/ ist guht zur bösen leber undt miltz/ auch fur den bösen magen/ Kombt zu hufft der lungen vertreibet geschwulst/ in der brust/ undt undter den ribben u: weihet die brust/ ist auch sehr guht vor die windt/

Dieses waszer ist sehr guht fur den husten/ wie auch for die Peste/ lentze/ ist auch sehr gut vor böse augen/ den es vertreibet fell undt flecken/ der Augen/ machet sie lauter ist auch guht wiedter Krampff damit gerieben/ wie auch vor den schlag Tucher darein genetz/ undt die gliedter darmit gerieben/ ist guht for das zittern/ ist auch guht vor alle giffti/ ge thierte/ undt hundte bisz.

Verzeichnis der Abbildungen mit Namen und Synonymen.

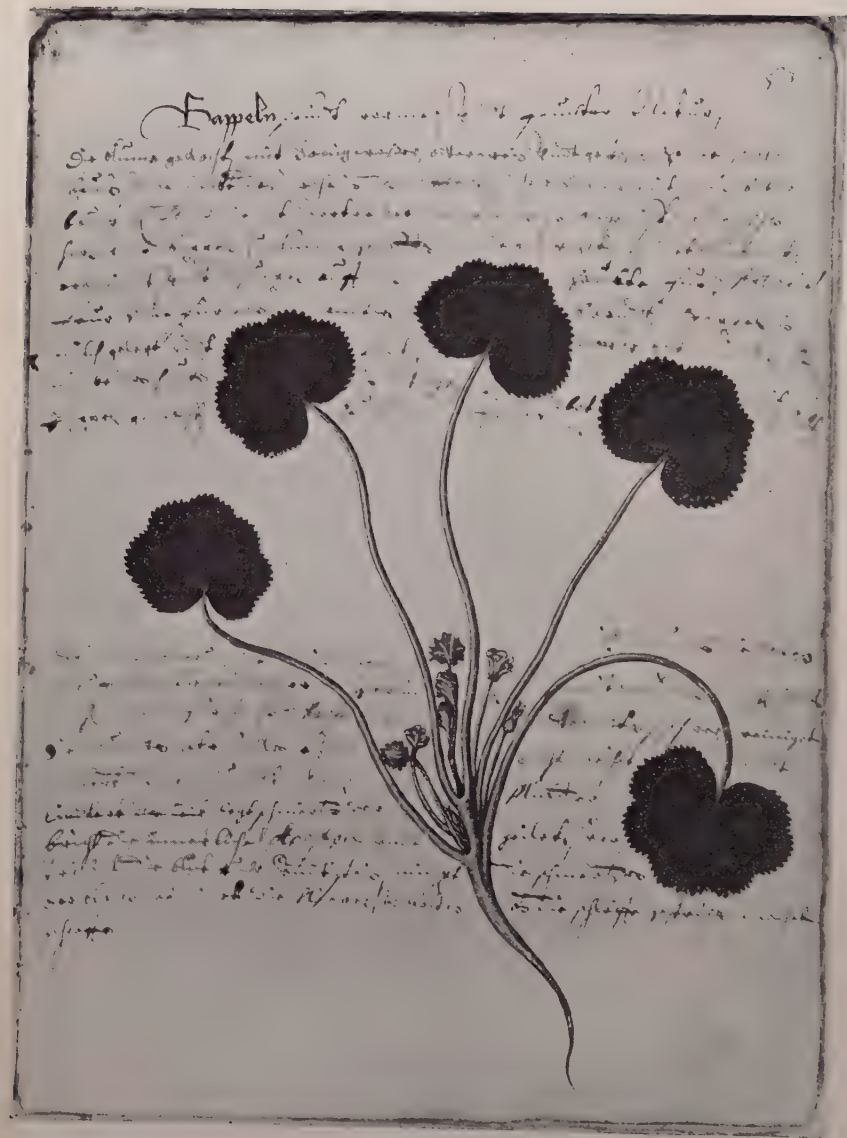
37 (r). **Beyfusz**

— *Artemisia vulgaris* L.

Synonyme auf 36 (v) (Taf. 1) :

Omero ¹⁾ : Toxotem, Seranstellum, Serpesiam, Charistelogiam, Partenicon ; *Prophetæ* ¹⁾ : Apolissos, Arthemesiam, Sodesua, Heoprax, leantropum, Chethesie, Onicantis verza, Theonitis, Ostantropii, Emach ronn, Bonox efestox, Philaterion megant, bubastes ; *Egiptii* : alsabalsa, litagoras sexasa, xobolus ; *Omero* : Chrisanteniis ; *Egiptii* : Mem ; *Romani* : Tanium, Tanagitan, Tanacipan.

¹⁾ Für die Rechtschreibung dieser Wörter vgl. Taf. 1.



Taf. 2. Bappeln, *Malva rotundifolia* L., fol. 53 (r).

(Phot. J. P. M. BIEGELAAR).

- 38 (r). **Eppich** — *Apium graveolens* L.
 39 (r). **Sanickel** — *Sanicula europaea* L.
 40 (r). **Winttergrun** — *Pirola minor* L.
 41 (r). **Druszkrawt** — *Sedum Telephium* L.
 42 (r). **Sijnnawe** — *Alchemilla vulgaris* L.
 43 (r). **Wermut** — *Artemisia Absinthium* L.

Synonyme auf 42 (v):

Greci: Absintheon, Bachipigron; *Latini*: Absinthium rusticum.

- 44 (r). **Deschelkrut** — *Capsella Bursa-pastoris* Moench
 45 (r). **Gundreiben** — *Glechoma hederacea* L.
 46 (r). **Grensinck** — *Agrimonia Eupatoria* L.

Synonyme ¹⁾ auf 45 (v):

Greci: Nymphaea, Praceam, Alieracalon, lothometram, Hydragagos, Hera-
 cleos, Andreos, Nerios, Clavum veneris, Digitum veneris; *Latini*: Alater,
 Herilania, Algam, Palustrem, Papaver Palustre.

- 47 (r). **Waltfan** — cf. *Eupatorium cannabinum* L.
 48 (r). leer
 49 (r). **S. Johannes Traubelein** ²⁾ — *Ribes nigrum* L.
 50 (r). **Eybisch** — *Althaea officinalis* L.

Synonyme auf 48 (v):

Greci: Altee, Alteraxita, Malaon, Tetree, Aeolomolatin, Anadren; *Itali*:
 Ibiscum, Donamolatin.

- 51 (r). **Bylsen** — *Hyoscyamus niger* L.

Synonyme auf 50 (v) (Taf. 1):

Greci: Vesciamon, Adamas, Dyoseiamos, Pythomon, Antiimon, Trifamon,
 Thamones, Anginos, Democritus, Triambion; *Pitagoas*: Ostone, Asio-
 zelon, Punici vincan; *Latini*: Jusquiani, Appollinarem; *Egiptii*: Safftheo,
 friges vincema, Alterculum, Simphonicam, Calicularem, Dentariam;
Thusci: Fabalubina; *Galli*: Gelli mineium; *Daci*: Dielman; *Prophetiae*:
 Eppoptice ligea.

- 52 (r). **Rawten** — *Ruta graveolens* L.

Synonym auf 51 (v):

Ruta.

- 53 (r). **Bappeln** (Taf. 2) — *Malva rotundifolia* L.

Synonym auf 52 (v):

Malua.

- 54 (r). **Frawen Muntz** — *Tanacetum Balsamita* L.
 55 (r). **Bolet** — *Mentha Pulegium* L.

¹⁾ Diese Synonyme gehören nicht hierher sondern zu *Nymphaea*.

²⁾ Vermutlich später hinzugefügt.

Synonyme auf 54 (v) :

Greci: Helichon, lencantos, blecho, Astenicon, Patx riron; *Prophetæ*: Panthagathon; *Latini*: Pulein, Ostames, Dymaron, blechon.

56 (r). **Balsam** — *Mentha spicata* L. var. *crispata*
Schrader

57 (r). **Maria rosen** — *Lychnis coronaria* Lam.

Synonyme auf 56 (v) ¹⁾ :

Lat.: verbaseum, officinalis Tapsus barbatus, candelaria, Candela regis, Lanaria, Lychnis coronaria; *Ital.*: Tasso barbasso; *Gall.*: Boillon; *Hisp.*: verbaseo.

58 (r). **Saluey** — *Salvia officinalis* L.

Synonym auf 57 (v) :

Saluia.

59 (r). **Eysencrut** — *Verbena officinalis* L.

Synonyme auf 58 (v) :

Greci: Iherabotane, Perstereona, Diose lacete, Pancremon, Aristereon, Cyparissos, Demetrias, Aschlepius alceas; *Egyptii*: Pempentar, Vertiperdum, Pitagosas; *Greci*: Tigrodion, Chamelicos, Sideritis, Curetis fersefomon; *Latini*: Verbenam, licinia, lustam, Columbina, Sirpina, Militarem.

60 (r). **Binsaug** — *Lamium album* L.

Synonyme auf 59 (v) :

Greci: Achoron, Afrodision; *Galli*: piper apium; *Latini*: Veneria, Radix nautica, Unguencia, urtica ²⁾).

61 (r). **Ysop** — *Hyssopus officinalis* L.

62 (r). **Meuszore** — *Hieracium Pilosella* L.

63 (r). **Pfaffen Krut** — *Taraxacum officinale* Web.

64 (r). **Genszdistell** — *Sonchus oleraceus* L.

65 (r). **Lydgengel** — *Asperula odorata* L.

66 (r). **Lebercraut** — *Asperula odorata* L.

67 (r). **Erpercrut** — *Fragaria vesca* L.

68 (r). Abbildung einer Blattrosette, vielleicht von *Senecio Jacobaea* L., Namen fehlt.

69 (r). **Pungen** — *Veronica Beccabunga* L.

70 (r). **Storch snabel** — *Geranium palustre* L.

71 (r). **Wegwart** — *Cichorium Intybus* L.

72 (r). **Balderian** — *Valeriana officinalis* L.

73 (r). **Bybenel** — *Pimpinella Saxifraga* L.

74 (r). **Schelcrawt** — *Chelidonium majus* L.

¹⁾ Mit anderer Hand geschrieben.

²⁾ Später hinzugefügt.

Synonyme auf 73 (v):

Greci: Celidonia, Peonia gtea, Amos elancios, Pondiostria, Felomneon, Ochomon; *Egiptii*: Machat, Moest; *Daci*: Ebustame; *Latini*: Hyrūdineā.

- | | | |
|---------|--|--|
| 75 (r). | Quendel | — <i>Thymus vulgaris</i> L. |
| 76 (r). | Gauchheijl ¹⁾ odter
Grundtheil ¹⁾ . | — <i>Anagallis arvensis</i> L. ssp. <i>coerulea</i> Vollm. |
| 77 (r). | Johanszkrut | — <i>Hypericum perforatum</i> L. |
| 78 (r). | Eselszfusz | — <i>Chenopodium Bonus-Henricus</i> L. |
| 79 (r). | Clapper plumen | — <i>Papaver Rhoeas</i> L. |
| 80 (r). | Dosten | — <i>Origanum vulgare</i> L. |

Synonyme auf 79 (v):

Greci: ... cletice, Aschlepleion, Onitis, Conile, Panaces; *Latini*: Cinula galica, Origanis.

- | | | |
|---------|----------------------------------|---|
| 81 (r). | Binerkraut | — <i>Erythraea Centaurium</i> Pers. |
| 82 (r). | Johanszplumē crut | — <i>Chrysanthemum Leucanthemum</i> L. |
| 83 (r). | Bromber | — <i>Rubus caesius</i> L. |
| 84 (r). | Floramor | — <i>Amaranthus spec.</i> |
| 85 (r). | Basilien | — <i>Ocimum basilicum</i> L. |
| 86 (r). | Pastemenkrut | — <i>Knautia arvensis</i> Duby |
| 87 (r). | Ziegenbandt ¹⁾ | — vermutlich <i>Knautia arvensis</i> Duby |
| 88 (r). | Ochsenzungen | — vermutlich <i>Echium vulgare</i> L. |
| 89 (r). | Weyszwurtz | — <i>Polygonatum officinale</i> All. |
| 90 (r). | Hirsz zung | — <i>Scolopendrium vulgare</i> Sm. |

Synonyme auf 89 (v):

Greci: lonchitis, Hennonion, Scolopendrion, Perteygias, Perterigites, fildroditis; *Itali*: Teuerion, fildroditis; *Prophetæ*: Hemogales; *Latini*: Splenion.

- | | | |
|---------|---------------------|--|
| 91 (r). | Mutter crawt | — <i>Melissa officinalis</i> L. |
| 92 (r). | Cypresze | — <i>Santolina Chamaecyparissus</i> L. |
| 93 (r). | Betomy | — <i>Betonica officinalis</i> L. |

Synonyme auf 92 (v):

Greci: Prioniten, Cesteon, Pirmen, Adiathon, indice, Cosmite, Psychotrosos, Chiariza, Feropondon, Pandiona, Diprimon; *Prophetæ*: Jeratorine; *Latine*: betonica, Feratam.

- | | | |
|---------|--------------------|-------------------------------|
| 94 (r). | Nachtschadt | — <i>Solanum nigrum</i> L. |
| 95 (r). | Goltkraut | — <i>Thalictrum flavum</i> L. |

¹⁾ Später hinzugefügt.

- 96 (r). **Walwurtz** — *Symphytum officinale* L.
 97 (r). **Wegdret** — *Polygonum aviculare* L.
 100 (r). **Rijngelblumen** — *Calendula arvensis* L.
 101 (r). **Cletten** — *Arctium minus* Bernh.
 102 (r). **Wegrich** — *Plantago lanceolata* L.

Synonyme auf 101 (v):

Greci: Arnoglosson, Arnion, ... acion, Cynoglosson, Eptaplepton, Polmeyton, Tirsion; *Prophetæ*: Urbani nemnonos; *Latini*: Plantaginum, septene rufa.

- 103 (r). **Breit wegrich** — *Plantago major* L.
 104 (r). **Hawswurtz** — *Sempervivum tectorum* L.

Synonyme auf 103 (v):

Greci: Aizon, Aniola, Aitaleo, Semper viuit, Eritales; *Latini*: Semper folium, Barba Jouis.

- 105 (r). **Veh disteln** — *Silybum Marianum* Gaertn.
 106 (r). **Berwinckel** — *Vinca minor* L.
 107 (r). **Borasz** — *Borago officinalis* L.
 108 (r). **Odermennig** — *Agrimonia Eupatoria* L.

Synonyme auf 107 (v):

Greci: Agrimonia, Cacocollam.

- 109 (r). **Garbe** — *Achillea Millefolium* L.

Synonyme auf 108 (v):

Greci: Miliofillon, Schinofillon, Chiliofillon, Stratiotice, Aeuillios, Dyoderam; *Latini*: Millefolium, Cereum siluaticum, supercilium veneris; *Galli*: Belis canda, Vicencias.

- 110 (r). **funff finger krawt** — *Potentilla reptans* L.

Synonyme auf 109 (v):

Greci: Pentafilon, Pentapetes, Pentagonon, Pentadactilon, Pseudoselmon, Pentatomon, Gallopētalōn, Xiloton, Assalciton, Pentacynon, Thunatus (oder Thunatic?), Eenpeij asuci, Thebeoci; *Lat.*: pentaphyllum¹⁾; *Prophetæ*: Ibeos, onix, Pteron ibeos, Crimidaetilon; *Galli*: Dropedilia; *Latini*: Mang martis; *Daci*: Quinque folium.

- 111 (r). **Awerhan** — *Antirrhinum Orontium* L.
 112 (r). **Wilde Kerbel** — *Umbellif. spec.*
 113 (r). **Creutz wurtz** — *Senecio vulgaris* L.
 114 (r). **Roszmarin** — *Rosmarinus officinalis* L.
 115 (r). **Swertel** — *Iris spec.*
 116 (r). **Rijttersporn** — *Delphinium Consolida* L.

¹⁾ Später hinzugefügt.

- 117 (r). **Heydenisch** — *Labiāt. spec.*
wundtkrauddt ¹⁾
- 118 (r). **Winden** — *Calystegia sepium* R. Br.
- 119 (r). **Stawer** — *Chenopodium polyspermum* L.
- 120 (r). **Gamandra** — *Veronica Chamaedrys* L.
- 121 (r). **Brunkresz** — *Nasturtium officinale* R. Br.
- Synonyme auf 120 (v):
- Greci*: Cardamon, Cynacoxdomon, Ibers, Cardaria; *Egyptii*: Semen;
- Italii*: Nastureium.
- 122 (r). **Dawben cropffe** — *Fumaria officinalis* L.
- 123 (r). **Aggley** — *Aquilegia vulgaris* L.

Am Ende dieser Publikation möchten wir Dr. H. UTTIEN, Privatdozent für die Geschichte der Botanik an der Reichsuniversität Utrecht, herzlich danken für die wertvollen Bemerkungen, die wir während unserer Arbeit von ihm erhielten.

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¹⁾ Namen später hinzugefügt.

THE GENERIC TYPE, AND A NEW SPECIES, OF THE BAMBOO GENUS SCHIZOSTACHYUM¹⁾ FROM JAVA

by

F. A. McCLURE²⁾

(Lingnan University, Canton, China).

Thanks to the kind cooperation of Dr. ROBERT PILGER, Director of the Botanical Gardens and Museums at Berlin-Dahlem, I have recently had the privilege of studying and photographing a unique specimen belonging to that institution, which bears the words „Schizostachyum Blumii nobis”, in the hand of NEES, the author of the species. Although there are no data on the sheet to indicate its source, or the date of the determination, this presumably represents NEES's type³⁾ of this species (which is the type species of the genus). At any rate, the available evidence⁴⁾ points to that conclusion, and the specimen agrees in all respects with NEES' description of the genus and of the type species (NEES, 1829, pp. 534—5). Since the original characterizations are so brief and, since those parts referring to the spikelets are so difficult to interpret, I present here a full description⁵⁾ of the rather fragmentary type specimen.

Schizostachyum Blumei NEES.

Floriferous branches slender, the *internodes* glabrous, smooth to the touch toward the base, rough (siliceous) in the upper half, especially in the areas not covered by the sheath; *leaf sheaths* glabrous, obscurely striate, somewhat compressed toward the apex, the *auricles* very inconspicuous, the *oral setae* poorly developed, the *ligule* short (less than 1 mm long) obscurely scabrous, the apex rounded, the margin smooth⁶⁾; *leaf blade* up to 36 cm long, flat, oblong-lanceolate, acuminate, the tip awn-like, scabrous, the base gently rounded, the secondary nerves 11—14 on each side, scarcely distinguishable from the tertiary, the upper surface entirely glabrous⁷⁾, the lower slightly rough to the touch and apparently glabrous but, under a 20-power binocular microscope, seen to be minutely and sparsely strigose and densely minute-papillose; *inflorescences* consisting of clusters of sessile pseudospikelets at the distal nodes of leafy⁸⁾ or leafless branches, the *pseudospikelets*⁹⁾ up to 27 mm long, slender, the *rachis branches* (axes of pseudospikelets)

glabrous, the terminal segment up to 6 mm long; the *prophylls* up to 5 mm long, ovate-lanceolate, the apex rounded, the keels equal or subequal, sparsely ciliolate or scabrous, rarely glabrous, the *bracts* usually 2, obtuse, glabrous, gemmiferous, I: 5—8 mm long, ovate-lanceolate, the apex usually split¹⁰), II: 10—15 mm long, oblong-lanceolate, mucronate or short-awned; fully developed, perfect *spikelets* up to 20 mm long, slender, firm, fusiform, gently tapering toward the tip, 1-flowered; *glumes* none; *lemma* tightly convolute, up to 20 mm long in perfect florets, scabrous to strigose toward the apex, and bearing a rather conspicuous tuft of deciduous hairs near each margin, otherwise glabrous, the veins few, somewhat prominent toward the apex, the central one exserted in a glabrous or obscurely scabrous awn, the awn up to 2.5 mm long; *palea* tightly convolute, glabrous, about as long as the lemma, narrowly sulcate, the apex prominently bicornate, the horns strongly tapered, coarsely and sparsely scabrous; normal *rachilla segments* none, prolongation of the rachilla as in the genus; *lodicules* none; *stamens* 6, not exserted, up to 12.5 mm long, the *filaments* ribbon-like, free, about 2.5 mm long, the *anthers* linear, the apex blunt, shallowly notched, the base rather deeply and unequally bifid; *gynaeceum* glabrous, the tip exserted in fully developed florets, the *ovulary* narrow, linear stalked (?), the *style* long, slender, tubular, scarcely distinguishable from the ovulary, the *stigmas* 3, short, plumose, recurved; *fruit* not seen.

A comparison of the rather fragmentary type of this species with numerous ample specimens of *Schizostachyum lima* (BLANCO) MERR. from China and the Philippine Islands gives the impression that the two species are very closely related. It is probable, however, that more complete material of *S. Blumei* will reveal additional differentiating characters. The following contrasting features are all that have been discovered thus far:

	<i>S. Blumei</i> (NEES's type)	<i>S. lima</i>
Upper surface of leaves	smooth to the touch	rough to the touch
Internodes of branches	entirely glabrous	more or less strigose, ultimately glabrescent
Ligules of culm sheaths	smooth ⁶)	fimbriate
Inflorescences	dark stramineous	light stramineous
Prophylls of pseudospikelets	shorter	longer
Rachis branches	longer (up to twice as long)	shorter

I wish now to direct attention to a series of nine mounted sheets of a bamboo collected by BLUME on Mt. Salak, Java, and preserved at the National Herbarium (Rijksherbarium) in Leiden. Through the courtesy of Dr. H. J. LAM, Director of the Rijksherbarium, and Dr. J. TH. HENRARD, the Conservator, I have recently had the coveted privilege of studying this fine series of specimens in detail. These specimens are of the greatest interest because Dr. HENRARD, who is thoroughly familiar with the history of the classic collections deposited at the Rijksherbarium, is of the opinion that they represent the collection from which NEES's type of the genus *Schizostachyum* was selected — it is, in other words, the supposed *type collection*. However, beyond admitting that the specimens agree very closely, in their vegetative characters, with NEES's type, and noting that they came from Java, the locality given by NEES (1829, p. 535), I shall not undertake to detail the evidence for this opinion. I shall emphasize, rather, the evidence against it.

In the first place, the sheets in BLUME's series do not bear the name *Schizostachyum Blumei* NEES either in the hand of the author of the name or in that of the collector, BLUME. And in the second place, the spikelets in the supposed type collection are uniformly quite distinct from those in NEES's type from Berlin-Dahlem in a number of characters. The regular occurrence of two functional florets in the spikelets of the Leiden series is, in itself, sufficient to indicate that it is specifically distinct from NEES's type, the spikelets of which are uniformly one-flowered, as described by NEES. And other spikelet characters strengthen the indication of specific distinctness between the two. The differences are brought out more fully in a tabular comparison on page 92 hereinafter.

It will be, I think, immediately obvious to anyone studying this table that NEES's type is specifically distinct from the „type collection” at Leiden. If NEES's type actually was selected from BLUME's series from Mt. Salak, Java, then a mixture certainly happened, probably when the specimens were gathered, the unique specimen sent to NEES certainly having been taken, perhaps inadvertently, from a different plant. — This sort of thing has occurred many times. I recently had occasion to identify some bamboo specimens from a locality in the same geographical area, and I found mixed under the same collector number, and bearing the same vernacular name, not two species merely, but two genera! Furthermore, all of the specimens were in a flowering condition.

Although I have not examined all of the types of the known species of *Schizostachyum* and related genera, I feel reasonably confident, from

a consideration of the characters enumerated in the published descriptions, that BLUME's series from Mt. Salak, Java, represents an undescribed species.

Schizostachyum biflorum, sp. nov.

Culmi circa 4 cm crassi ¹¹⁾; *vaginis culmorum* anguste triangularis, *setis in ore* usque ad 10 mm longis, obscure scabris; *internodiis ramorum* plus minusve scabris vel pubescentibus; *vaginis foliorum* glabris, *auriculis* minutis vel carentibus, *setis in ore* obscure scabris, erectis, usque ad 10 mm longis, *ligula* usque ad 2.5 mm longa, scabra, longe fimbriata, fimbriis usque ad 4 mm longis, laevibus; *petiolo* usque ad 10 mm longo, crasso, glabrescente vel supra basem minute scabro; *pseudospiculis* in nodis rare solitariis, plerumque plus minusve dense congestis; *rachi* usque ad 10 mm longa, glabra vel sparse scabra; *prophyllis* parvis, usque ad 2 mm longis, carinis ad apicem conspicue ciliatis; *spiculis* usque ad 18 mm longis, bifloris; *floribus* dissimilibus; *glumis vacuis* carentibus; *lemmatibus* paucinervis, apice carinatis, subulatis, *lemmate* in flore inferiore 7—8.5 mm longo, laxo convoluto, in flore superiore 10—11.5 mm longo, striete convoluto, *palea in flore inferiore* usque ad 13 mm longa, longe exserta, laxo convoluta, late sulcata, sulco apice sparse hirsuto, 2-carinata, carinis praesertim ad apicem scabris, apice truncata, obscure emarginata; *palea in flore superiore* usque ad 13 mm longa, parve exserta, striete convoluta, anguste sulcata, apice obscure bifida et scabra; *rachillae segmento* floris inferioris usque ad 4.5 mm longo, glabro, nitido, curvato, compresso, in marginibus versus apicem expansum conspicue ciliato; reliquis ut in genere.

In the English description that follows I have given, for the benefit of those who may feel skeptical as to the generic disposition of this species, a rather full consideration of its characters, without eliminating those which are obviously of generic rank.

Culms as thick as the arm („armdikker bambu”, teste Blume ¹¹⁾; *culm sheaths* ¹²⁾ deciduous, narrowly triangular, truncate, with poorly developed *auricles*, obscurely scabrous ¹³⁾ *oral setae*, a fimbriate, scabrous *ligule* and a reflexed, linear-lanceolate, subulate *sheath blade*, the latter with its upper surface more or less densely strigose; *branches* slender, fasciculate, usually subequal, rarely with one somewhat longer and stouter than the others (up to 50 cm), only sparingly rebranched, sometimes bearing leaves below the distal floriferous nodes, the *basal internodes* scabrous or pubescent throughout, or glabrous at their bases and sparsely appressed-pubescent and glabrescent toward their tips, the *distal internodes* of branches and branchlets retrorsely scabrous; *branch*

sheaths somewhat persistent, the *blades* of those at the upper nodes progressively more tardily deciduous, and more awn-like in form; *leaves* variable¹⁴), those associated with inflorescences smaller and more delicate than those described here, which were produced on sterile branches; *leaf sheaths* up to 7 or more to a branchlet, thick, compressed toward the apex, glabrous or glabrescent, obscurely striate, the *auricles* poorly developed, usually entirely lacking in the lower ones, the *oral setae* borne both on the auricles and at either side of them (present whether the auricles are visibly developed or not), numerous, slender, erect, usually straight, up to 10 mm long, pale, obscurely scabrous¹³), the *ligule* well developed, truncate, scabrous or velutinous, up to 2.5 mm long (not including the fimbriae) the nearly straight margin long-fimbriate, the fimbriae smooth, pale, very slender, straight, up to 4 mm long; *leaf blade* up to 40 cm long and 7.5 cm wide, broadly lanceolate, acuminate, with a long, slender, scabrous, subulate tip, somewhat plicate, the upper surface glabrous, the lower glabrescent, or sometimes remaining sparsely pubescent along the margin and near the base, paler green than the upper, the *secondary veins* 10—13 on either side, the tertiary 7—9 in each space, several tertiary veins along the outer edge of the blade scabrous on the upper surface, transverse veinlets clearly visible in young leaves, scarcely so in the older ones, the *petiole* up to 10 mm long, stout, minutely pubescent (sometimes glabrescent) on the upper surface at the base; *inflorescence* variable, consisting of more or less dense clusters of pseudospikelets^{15, 9}), the *rachis branches*¹⁶) slender, up to 10 mm long, each borne in the axil of a sheath or bract and bearing at its base, first a small prophyll, then several gemmiferous bracts, and finally a 2-flowered spikelet, the internodes of variable length (the penultimate one longest in those examined), glabrous or sparsely retrorse-scabrous, flattened above the point of insertion of the buds, the apex (the point of insertion of the spikelet) expanded, cupulate, usually more or less oblique, the *prophylls* small, thin, 1.5—2 mm long, broad, obtuse, the keels winged, ciliate, the cilia conspicuously tufted at the apex, the *bracts* usually 3, persistent, gemmiferous, the lowest one often split at the tip by the pressure of the developing bud inside, about 5 mm long, thinnish, few-nerved, obtuse and minutely apiculate, the successively higher ones approaching the lemma in size, shape, texture and venation; *empty glumes* lacking; *spikelets* 2-flowered, up to 18 mm long in those examined, the less well-developed (progressively sterile) ones proportionately smaller; the two *florets* dissimilar¹⁷), rather variable as between the different pseudospikelets studied; lemmas firm in texture, ovate-lanceolate,

acute or obtuse, apiculate to subulate, several-nerved, the mid-nerve prominent toward the tip, *the lemma of the lower floret* 7—8.5 mm long, loosely convolute, *that of the upper floret* 10—11.5 mm long, tightly convolute; *the palea of the lower floret* up to 13 mm long, long-exserted, chartaceous to somewhat firm, loosely convolute, broadly sulcate, the lower portion of the sulcus occupied by the normal rachilla segment, the upper portion coarsely scabrous, 2-keeled, the keels scabrous, especially toward the narrow, truncate or rounded, obscurely emarginate apex; *the palea of the upper floret* up to 13 mm long, slightly exserted, thin and membranaceous below, increasingly indurate toward the obscurely bifid apex, tightly convolute, narrowly sulcate, the sulcus occupied, usually throughout its length, by a slender, glabrous, shining, bristle-like *prolongation of the rachilla*, the latter often bearing a minute rudiment of a floret; *normal rachilla segment* (at the back of the palea of the lower floret) up to 4.5 mm long, curved, glabrous and shining, strongly flattened, gradually narrowed, the edges scabrous, toward the base, and bearing on one or both margins a prominent fringe of cilia toward the expanded, excavate apex; *lodicules* lacking; *stamens* 6, included, the *filaments* 1 mm long, ribbon-like, the *anthers* 4—5 mm long, slender, linear, the apex blunt or obscurely bifid, the base deeply and unequally 2-lobed; *gynaeceum* up to 10 mm long, slender, the *ovulary* glabrous throughout, very narrow, the *style* long, slender fistulose, stiff, somewhat angular, the *stigmas* 3, usually exserted, short, plumose, purplish; *fruit* not seen.

The foregoing description was prepared from nine specimens in the Rijksherbarium at Leiden, all with notes in the handwriting of the collector, BLUME, but without dates or collector numbers. Each sheet, however, bears a distinctive accession number in the Rijksherbarium series, to which the initials HLB (Herbarium Lugduno-Batavum) are prefixed. The HLB numbers of the sheets are: 908.84—909 (floriferous branches only), 908.84—948 (floriferous branches only), 908.84—971, the nomenclatural type (floriferous branches with culm sheaths), 908.90—827 (floriferous branches only), 908.100—74 (inflorescences, with leaves associated on some of the branches), 909.65—236 and 909.65—237 (leafy, vegetative branches only), and 909.67—87 (floriferous branches only). Vernacular name, *Bambu Tamian* or *B. Tamiang* (sundanese); leg. in October at the type locality, Mt. Salak, Java (near Buitenzorg, BLUME's place of residence).

The sheet bearing HLB number 908.84—971 is designated as the *nomenclatural type* (BRIQUET, p. 3, Art. 18).

Comparison of the lower and upper florets of the spikelet
in *Schizostachyum biflorum*.

	Lower floret	Upper floret
Insertion	borne on the terminal segment of a rachis branch; abscission more prompt	borne on a rachilla segment; abscission less prompt
Lemma	shorter (7—8.5 mm) loosely convolute	longer (10—11.5 mm) tightly convolute
Palea	loosely convolute, obviously 2-keeled, broadly sulcate, the sulcus occupied below by a normal rachilla segment, and coarsely scabrous above, the keels scabrous toward the broad, truncate, emarginate apex	tightly convolute, obscurely 2-keeled, narrowly sulcate, the sulcus occupied throughout by a slender, bristle-like prolongation of the rachilla, finely scabrous toward the narrow, obscurely bifid apex

This species is apparently most closely allied, in its vegetative characters at least, to *Schizostachyum Blumei* and *S. lima*. It is readily distinguishable from these species, however, by the spikelet characters, as is shown in the following tabular comparison:

	<i>Schizostachyum Blumei</i> (NEES's type specimen) and <i>Schizostachyum lima</i>	<i>Schizostachyum biflorum</i> (BLUME's series at Leiden)
Prophylls of the pseudo-spikelets	longer, the cilia on the keels less prominent, sometimes entirely lacking	shorter, the cilia on the keels more prominent, each keel with a conspicuous tuft of cilia at its apex
Spikelets	compact, uniformly 1-flowered	loose, uniformly 2-flowered
Normal rachilla segments	lacking	one, up to 4.5 mm long
Lemmas	up to 20 mm long, tightly convolute	in the flower floret, up to 8.5 mm long, loosely convolute; in the upper floret, up to 11.5 mm long, tightly convolute

	<i>Schizostachyum Blumei</i> (NEES's type specimen) and <i>Schizostachyum lima</i> (cont.)	<i>Schizostachyum biflorum</i> (BLUME's series at Leiden) (cont.)
Paleas	about as long as the lemma, tightly convolute, narrowly sulcate, not conspicuously keeled, the apex prominently bicornate	in the flower floret, up to 13 mm long, long-exserted, loosely convolute, broadly sulcate, conspicuously 2-keeled, the apex truncate and obscurely emarginate; in the upper floret, up to 13 mm long, visibly exserted, tightly convolute, narrowly sulcate, not conspicuously keeled, the apex truncate, obscurely bifid

The enumeration of the vegetative characters by means of which these three species may be distinguished must be deferred until those of *S. Blumei* and those of *S. biflorum* are more fully known.

Acknowledgements.

In addition to acknowledgements made in the foregoing text, I wish to enumerate certain other obligations. It is a pleasure to acknowledge the assistance derived through discussions of various aspects of this interesting subject with Mrs. AGNES CHASE, Associate Agrostologist of the Division of Plant Exploration and Introduction, of the Bureau of Plant Industry, the U. S. Department of Agriculture. The photograph of the nomenclatural type of *Schizostachyum biflorum*, and the line drawings (from my pencil sketches) were made by the technicians at the Rijks-herbarium, under the supervision of Dr. HENRARD. For permission to reproduce the photograph of NEES's type, I am obligated to the Division of Plant Exploration and Introduction, of the Bureau of Plant Industry, the U. S. Department of Agriculture. Furthermore, I am indebted to the Board of Directors, and the Board of Trustees, of Lingnan University, for the extension of my leave of absence, which made possible the visit to Leiden. To the Rockefeller Foundation I am indebted for financial

assistance which has made possible the assembling of the necessary literature bearing on this and other problems relating to the Oriental bamboos.

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Footnotes.

1. Paper from the Lingnan Natural History Survey and Museum, Lingnan University, Canton, China.
2. Curator of Economic Botany, L. N. H. S. M., and Professor of Botany, Department of Biology, Lingnan University (on leave, 1933—1936).
3. Until recently I had not been able to locate the actual type of *Schizostachyum Blumei* NEES. Upon the discovery of BLUME's supposed type collection at Leiden last summer, I prepared a revised description of the genus *Schizostachyum* to include this latter species, which is characterized by 2-flowered spikelets. That paper is being published in the Lingnan Science Journal (McCURE, 1936). From the statements therein it is clear that I was under the impression that the plant represented by BLUME's collection at Leiden was conspecific with NEES's type, although it did not agree in the spikelet characters with NEES's description. I attributed the discrepancies to the fact of the confusing nature of the inflorescences in this genus, imputing to NEES faulty observation of which he was not guilty, though anyone will admit that his description is somewhat vague, to say the least. And certainly it does not convey a clear impression of the inflorescence characters to one not already thoroughly familiar with this genus. The addition to the generic description are appropriate enough, but my faulty interpretation of BLUME's collection as conspecific with NEES's type must be kept in mind in reading the associated text.
4. This is the only sheet of this species which has come to light which bears the name *Schizostachyum Blumei* in NEES's own hand. There are two envelopes attached, each containing dissections of portions of the inflorescence. One is labeled, in NEES's hand, „spicula 1.”

5. This description will probably have to be modified more or less, and certainly will have to be supplemented, when living plants of the species have been studied. The observations of microscopic details recorded were made with the aid of a binocular microscope fitted with lenses giving a magnification of 20 diameters.
6. The margin of the ligule in this genus is very commonly fimbriate at first, and may become smooth in age by weathering or other agency. The smooth condition of the obviously weathered ligules in NEES's type is no certain indication that they were not fimbriate originally.
7. The surface outgrowths, as well as other foliar characters, are extremely variable in this genus, and should receive only minor emphasis as criteria for distinguishing species.
8. One floriferous twig bears leaf sheaths from which the blades have fallen.
9. Special attention is directed to the importance of these units, in this genus and related genera, as affording the only clue to an understanding of the development of the inflorescence and its variable expression. An important feature of these pseudospikelets is the exceedingly variable nature of their different component elements, more especially those of the spikelets by which they are terminated. The spikelets may be perfect, and promptly deciduous, on the relatively earlier pseudospikelets (rachis branches of relatively lower order) but are progressively less well developed, and ultimately sterile, on the relatively later ones (rachis branches of relatively higher order). Furthermore, the relative size, shape and other features and relationships of the lemmas and paleas of given florets change in correspondence with this progressive degeneration of the pseudospikelets. It should be added that the prophylls and bracts of the pseudospikelets are also variable in size and texture, those on relatively later ones being relatively smaller in size and more delicate in texture.
It is pointed out, and should be kept in mind, that the description here given is based on a study of the most fully developed pseudospikelets *available* in the specimen cited. Since the *most fully developed* perfect spikelets are very promptly deciduous, these have not been seen. Evidence of their loss is to be seen in the presence of the empty rachis tips from which they fell. Subsequent study of fresh material should, therefore, reveal further data on these characteristic, but very elusive structures.
10. NEES (1829, p. 534, under „Observ. III.") where he says (line 14 from the bottom): „gluma inferior minor, obtusa, bifida, ..." must have been referring to this feature.
11. BLUME's expression, „armdikker" (thick as the arm), written on one of the field labels, probably refers to the thickness of the arm at the wrist. No culm specimen of the other species I have seen exceeds this size. Furthermore, the greatest culm thickness recorded for any species of this genus, to my knowledge, is that of *S. Hallieri* GAMBLE, which is 4 cm.
12. The culm sheaths are represented only in HLB 908.84—971, by two small, weathered examples loosely attached to the upper nodes, only one of these being sufficiently well preserved to reveal the general characters given.
13. The scabrousness scarcely visible with an ordinary 8-power hand lens, but clearly discernible under a binocular microscope giving a magnification of 20 diameters.

14. Only HLB 908.100 — 74 has leaves associated *on the same twigs* with inflorescences. Here the blades of the larger ones (probably developed during the vegetative stage of the plant) have fallen, those remaining (on other floriferous twigs) having blades up to 34 cm long and 4—5 cm wide, with correspondingly smaller sheaths, slightly less well developed oral setae and ligular fimbriae, but otherwise identical with those of the sterile specimens, HLB 909.65 — 236 and 237, on which my leaf descriptions have been based.
15. These at first solitary at the nodes of primary or secondary branches and twigs, but soon, by development of their basal buds into new pseudospikelets, they become increasingly numerous and crowded, ultimately forming dense, subglobular heads.
16. No attempts is made here to distinguish between the first, or primary, rachis, and the rachis branches of relatively higher order, as no constant difference, except a minute difference in size, has been noted.
17. See tabular arrangement of contrasting features of the lower and upper florets which follows the description.

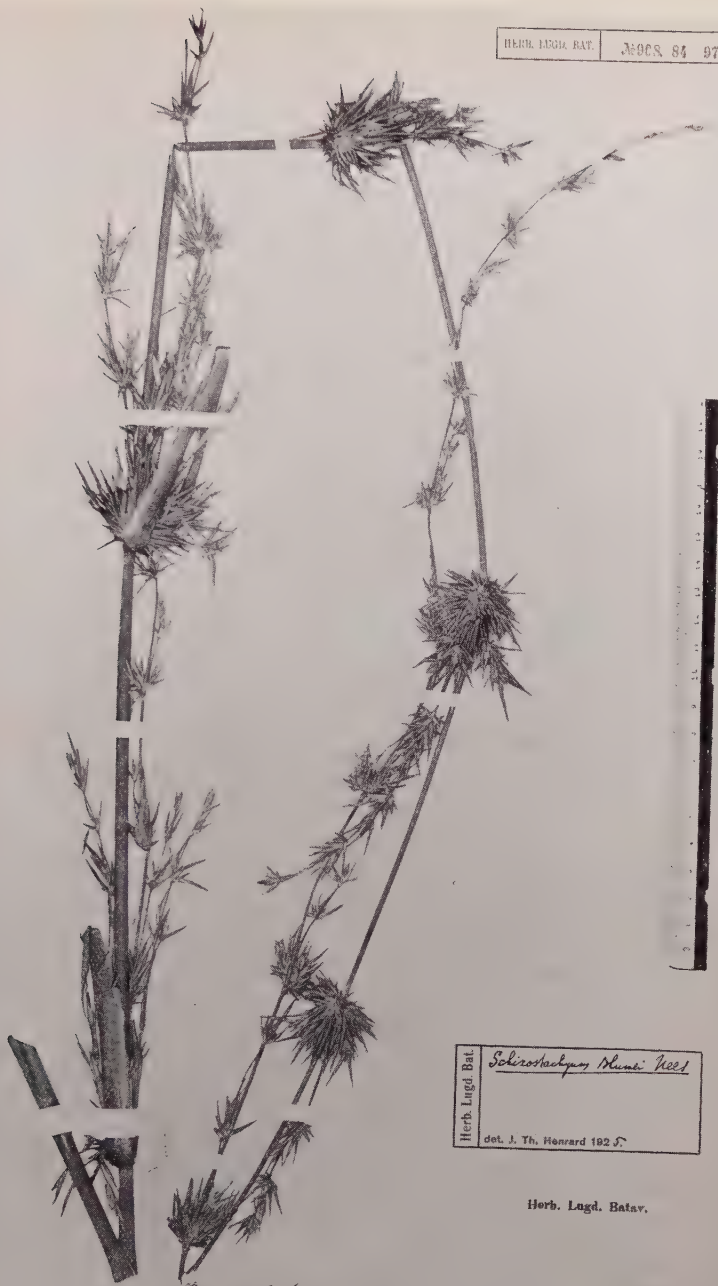
Illustrations.

1. Photograph of *Schizostachyum Blumei* NEES, the nomenclatural type at Berlin-Dahlem.
 2. Photograph of *Schizostachyum biflorum* sp. nov., the nomenclatural type at Leiden (HLB 908.84 — 971).
 3. Sketch showing a pseudospikelet of *Schizostachyum Blumei* NEES ($\times 2\frac{1}{2}$) from the type.
 4. Sketch showing spikelet of same ($\times 5$) from the type.
 - 4a. Sketch showing palea of same, with prolongation of rachilla, and stigmas ($\times 5$) from the type.
- The following line drawings all from *Schizostachyum biflorum* sp. nov.:
5. Well developed pseudospikelet representing a primary branch of the rachis (from HLB 908.84 — 971).
 6. Schema of the structure of the foregoing.
 7. A poorly-developed pseudospikelet (from HLB 908.84 — 909).
 8. Schema of same.
 9. Prophyllum from same.
 10. Spikelet, showing the two florets (from HLB 908.84 — 971).
 11. Lemmas of the lower (a) and upper (b) florets, respectively, of the same.
 12. Paleas of the lower (a) and upper (b) florets, respectively, of the same.
 13. Rachis branch (axis of pseudospikelet) stripped of its appendages (from HLB 908.84 — 909).
 14. Normal rachilla segment (at back of lower floret) (from HLB 908.84 — 971).
 15. Prolongation of the rachilla (at back of upper floret) (from HLB 908.84 — 971).
 16. Culm sheath (enlarged) from upper node (HLB 908.84 — 971).
 17. Apex of leaf sheath and insertion of petiole (from HLB 909.65 — 237).
-



Fig. 1.

HERB. LUGD. BAT. No. 84 971



Herb. Lugd. Bat. *Sclerostachya Munzii* Nees
det. J. Th. Honnard 192 J.

Herb. Lugd. Batav.

200190
coll. of L.P.
BAMBUA

Bambusa nana (L.)
var. *Bambusa*
Sulag. (det.)

Jav.

Fig. 2.

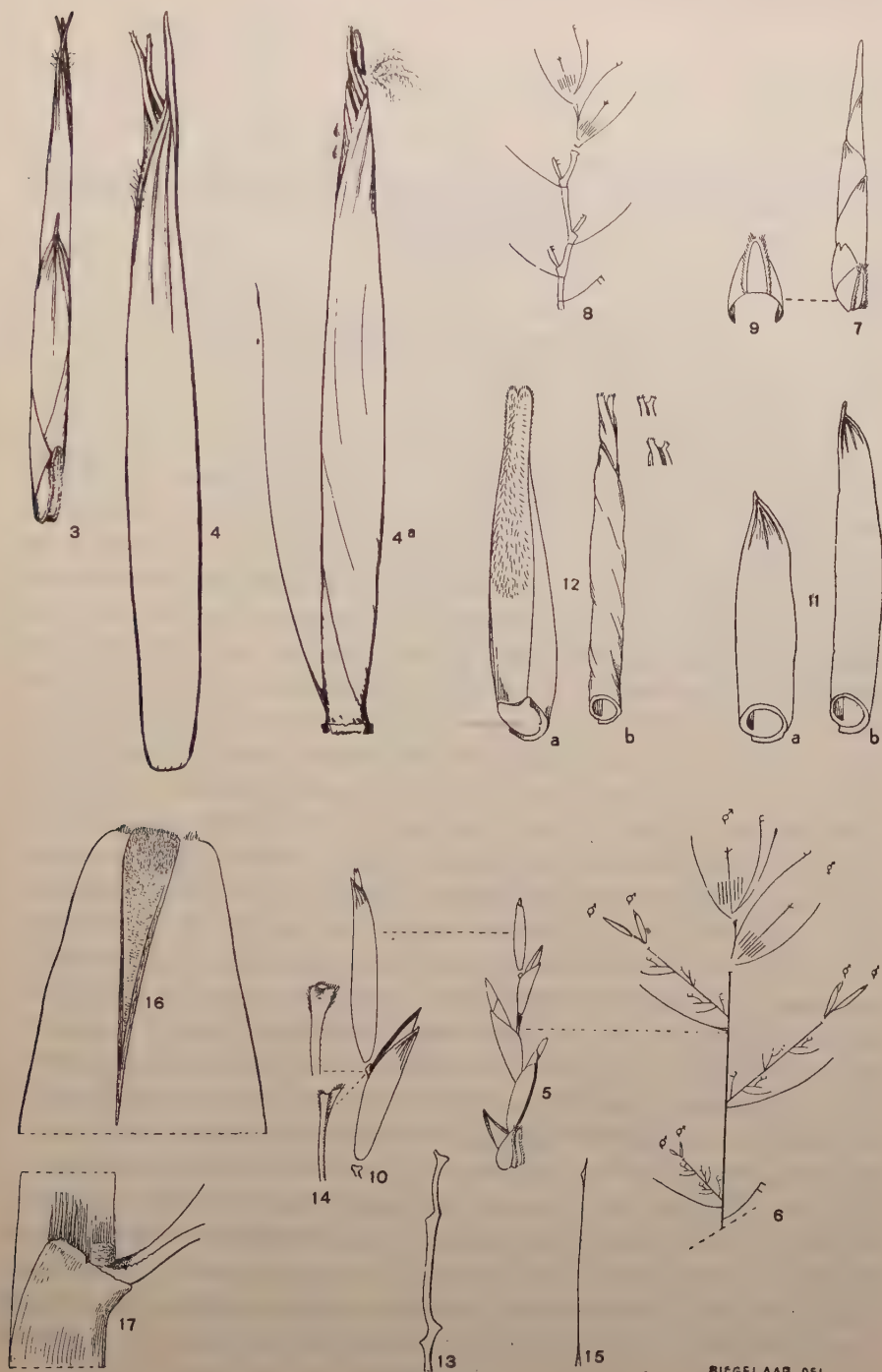


Fig. 3—17.

BIEGELAAR DEL

ON DECALOBANTHUS, A NEW GENUS OF CONVULVULACEAE FROM SUMATRA

by

S. J. VAN OOSTSTROOM

(*Leiden*).

Being occupied with studies on the *Convolvulaceae* of Netherlands India I met with a remarkable specimen in the Buitenzorg Herbarium, collected by Dr. O. POSTHUMUS during the expedition in Djambi (Sumatra) in the year 1925. At first sight this plant seemed to be a *Merremia*. A closer examination, however, soon showed some important differences with that genus, especially in respect to the corolla, which has a long, narrow and rather fleshy tube and a limb with 5 short, reflexed (or patent?) lobes. Each lobe is deeply bifid, so that the limb appears 10-lobed. The middle part of the lobes is fleshy just as the tube; it corresponds with a midpetaline field of the corolla of most genera of *Convolvulaceae*, the lateral parts of the lobes (lobules) are much thinner, membranaceous and nerved. They represent the interpetaline fields of the Convolvulaceous corolla. In general there is a resemblance with the essential corolla construction of many species of *Erycibe*, where the lobes are also bifid and possess a thick middle part and two membranaceous lobules. The lobules in the new genus are not fully equal in size, those on the right of each lobe, as seen from the inside of the corolla being always slightly larger. The corolla is fully glabrous or bears some papillae at the base of the filaments. The pistil has a two-celled ovary, each cell with 2 ovules and bears a long, filiform style with two globular, papillose stigmas, exactly as in *Merremia*. I suppose this plant to be closely related to that genus, but as the corolla with its fleshy tube and remarkable lobes is so different from all other species, it is impossible to incorporate it in *Merremia* without important alteration of the generic limits. I, therefore, propose to establish a new genus, under the name of *Decalobanthus* (derived from δεκα, ten, λοβος, lobe and άνθος, flower).

Decalobanthus, nov. gen.

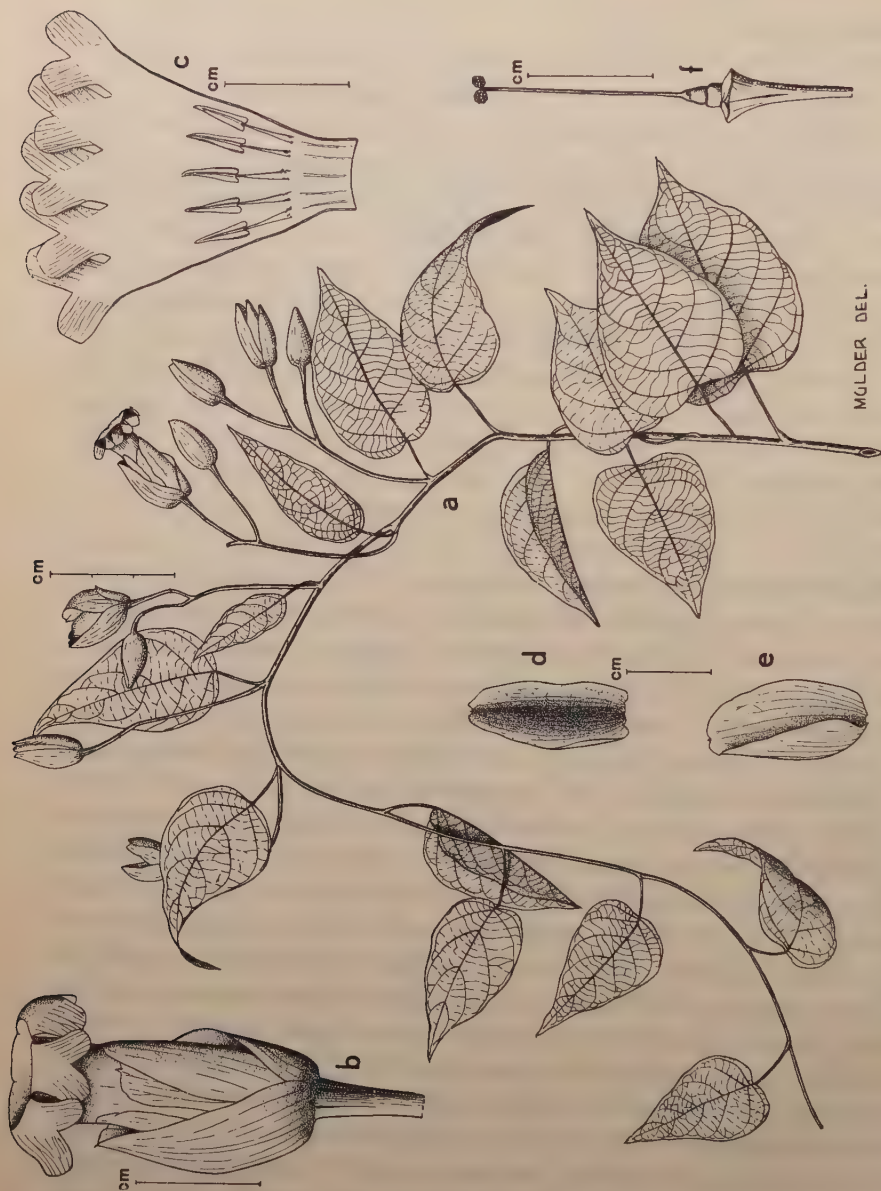
Planta herbacea, glaberrima, *caulibus* procumbentibus, gracilibus. *Folia* ovata, apicem versus attenuata, basi truncata vel subretusa. *Inflorescentiae* axillares, pedunculatae, 1- vel 2-florae, pedicelli subangulati, apice paullo incrassati. *Sepala* majora, subaequalia vel exteriora paullo breviora, ovata vel elliptica, obtusa vel subemarginata. *Corolla* hypocrateriformis, tubo crasso, longe anguste obconico vel cylindrico, basi attenuato, enervoso, limbo 5-lobato, lobis reflexis (vel patentibus?), parvis, bifidis, medio crassioribus, lobulis oblongis, obtusis, membranaceis. *Stamina* in tubum corollae inserta, *antheris* oblongis vel ovatis basi sagittatis, *filamentis* applanatis, basin versus sensim dilatatis. *Pollen* inermis. *Ovarium* 2-loculare, glabrum, loculis 2-ovulatis, *stylo* filiforme, indiviso, *stigmatibus* 2, globosis, papillosis. *Discus* cylindricus, obscure lobatus. *Fructus* ignotus.

Typus generis: *Decalobanthus sumatranus* n. sp.

Decalobanthus sumatranus, nov. spec.

Planta herbacea, glaberrima, *caulibus* procumbentibus, teretibus, fistulosis, 1—2 mm crassis. *Folia* petiolata, petiolis laminis brevioribus, 10—17 mm longis, ovata vel anguste ovata, apicem versus sensim attenuata, acumine obtuso, mucronulato, basi truncato vel paullo retuso, 4—6 cm longa, 2—4 cm lata, supra subnitida, subtus pallidiora, nervo mediano nervisque primariis 6—7 utrinque prominentibus, nervis secundariis subparallelis, nervis tertiis reticulatis. *Inflorescentiae* axillares, 1—2-florae, pedunculi striati vel angulati, 1.5—3.5 cm longi; pedicelli subangulati, apice incrassati, 10—15 mm longi. *Sepala* ad 19 mm longa, subaequalia vel exteriora paullo breviora, valde concava, exteriora 2 ovata, subemarginata, obsolete mucronulata, coriacea, interiora 3 elliptica, subemarginata vel obtusa, obsolete mucronulata, coriacea, margine scariosa. *Corolla* flava, hypocrateriformis, tubo longe et anguste obconico vel cylindrico, basi attenuato, subcarinoso, ad 2.5 cm longo, limbo 5-lobato, lobis parvis, reflexis (vel patentibus?), bifidis, medio crassioribus, lobulis membranaceis, oblongis, obtusis, subinaequalibus, circiter 5—5.5 mm longis, striatis. *Filamenta* circiter 6.5 mm supra basin corollae inserta, applanata, basin versus sensim dilatata, glabra vel basi papillosa, circ. 5 mm longa; *antherae* oblongae vel ovatae, 6 mm longae, basi breviter sagittatae. *Ovarium* 2-loculare, conicum, glabrum, loculis 2-ovulatis, *stylo* filiforme, ad 16 mm longo, *stigmatibus* 2, globosis, papillosis. *Discus* cylindricus, 1.25 mm altus, obscure lobatus.

MALAY ARCHIPELAGO: S u m a t r a, Djambi, near Bangko, along road



MULDER DEL.

Fig. 1. — *Decalobanthus sumatranus* V. OOSTRUP, n. sp., a: branch of the type-specimen, POSTHUMUS 571; b: flower (I am not sure whether the corolla lobes are spreading or reflexed); c: corolla, laid open, schematically; d: sepal 1, inside; e: sepal 3, inside; f: pistil.

to Korintji, 60 m alt., open sunny place on weathered tuff, creeping; fls. yellow, stamens white; July 18, 1925, leg. Dr. O. POSTHUMUS 571 (type in the Buitenzorg Herbarium).

Vernacular name: Akar tanah (akar = root, tanah = soil).

THE TAXONOMY AND NOMENCLATURE OF RUTACEAE-AURANTIOIDEAE ¹⁾

by

TYÔZABURÔ TANAKA

(Taihoku Imperial University, Taihoku, Taiwan, Japan).

From the time of CORREA DE SERRA (1805), MIRBEL (1813), DE JUSSIEU (1815), ROEMER (1846), BAILLON (1855), and OLIVER (1861), a great stress is laid upon the number of stamens, locules, and ovules to the primary classification of the *Rutaceae-Aurantioideae*, but the importance of the presence of an inflorescence and its reduction of the number of flowers, the pinnate leaf and its reduction of the number of leaflets, venation of the leaf, its conspicuousness and the construction, the origin and development of the wing upon the rachis and the petiole, the number and the nature of thorns upon the branches, the fundamental number of the floral organs and its increase or decrease, the formation of pulp vesicles, the hardening of the rind of fruits, and other points affecting the universal affinity of plants as a whole, have been quite neglected in the past, the consideration of which would have helped the orderly development of the taxonomy of the subfamily. It is clear that the increased number of the floral organs and the development of the pulp vesicles are undoubtedly very important systematic features of the subfamily, but such are those out of many significant characteristics which take part in the classification of the whole group. A character like the increase or decrease of the number of locules, for instance, can occur even within one genus, as in the well-known case of *Citrus* and *Fortunella*. The ovules may be single, or binary, either superposed or collateral, or otherwise numerous in uni-, or biseriate arrangement: the gradation of this character is also continuous, as in the case of *Tripkasia*, *Meropia* and *Wenzelia*, all having similar floral characteristics but the last only has biseriate ovules. Unquestionably, the biseriate character is derived from collateral arrangement which is commoner in rather advanced groups. The increase of the number of filaments more than ten,

¹⁾ Contributions from the Horticultural Institute, Taihoku Imperial University, No. 17.

occurs also in tribes not closely related, as *Aegle* (also *Feroniella*, and *Balsamocitrus* Section *Afraegle*), *Oxanthera*, and *Citrus* (also *Poncirus* and *Fortunella*), but the true pleiotaxy of stamens occurs only in *Aegle* and in the Section *Citrophorum* of the genus *Citrus*. The pulp-vesicle formation is also seen in various tribes widely divergent from each other, such as *Aegleae-Svingleinae* (*Svinglea*), *Lavangeae* (*Pleiospermium*), *Atalantiae* (*Atalantia* and *Severinia*), *Microcitreae* (*Microcitrus*, *Eremocitrus*, *Monanthocitrus* and *Pleurocitrus*), *Aurantieae-Citropsinae* (*Citropsis*), and *Aurantieae-Citrinae* (*Poncirus*, *Citrus* and *Fortunella*).

It is very clear that the starting point of the subfamily is represented by *Micromelum* and *Glycosmis*, both having pinnate leaves with alternate leaflets and unwinged rachis, many-flowered inflorescences, an ovary with less than 5 locules and one or two superposed ovules in each locule. Having dry fruits and contortuplicate cotyledons, *Micromelum* forms the most primitive tribe *Micromeleae*, somewhat analogous to the *Rutoideae-Cusparieae* of tropical America. The genera *Glycosmis*, *Murraya* and *Clausena*, altogether forming the tribe *Clauseneae*, have fleshy fruit, plano-convex cotyledons and unarmed branches with pinnate leaves, resembling the *Micromelum* in general appearance of the plant. It is worthy of note that the great reduction of the number of leaflets is seen in such species, as *Micromelum diversifolium* MIQ., *Clausena Guillauminii* TANAKA, and *Murraya stenocarpa* TANAKA (= *Chalcas stenocarpa* TANAKA), and the alate rachis is found in *Clausena Wallichii* OLIV., *C. Guillauminii* TANAKA and *Murraya alata* DRAKE. The reduction of the number of locules in *Murraya* is also to be noted. No thorn-bearing plants occur in these tribes, except in the doubtful species, *Clausena impunctata* HIERN, which has curved paired axillary spines, almost entirely opposite leaflets, and a distinctly winged rachis. The gradation of this tribe into the next tribe *Aegleae*, having hard-shelled fruits, is seen in the Malayan genus *Merrillia*, which has large flowers, reminding of *Murraya* (Subgen. *Euchalcas* TANAKA), and a winged rachis like *M. alata*, mentioned above.

The tribe *Aegleae* is characterized by the woody rind of the fruit, a large number of locules and ovules, frequent occurrence of trifoliolate leaves, occasional presence of appendages at the bottom of the filaments, resembling some members of the family *Simarubaceae*. The development of thorns of different type is first definitely seen in this tribe, as shown by curved paired thorns, like some members of the subfamily *Toddalioideae*, and in *Feroniella pubescens* TANAKA; straight double thorn in *Aegle* and *Balsamocitrus*; and straight single thorn in *Feronia*, and *Feroniella*

lucida SWINGLE. Oppositely pinnate leaves are first seen in this tribe, but in the preceding tribe, the tendency of becoming so in alternately pinnate species, like *Glycosmis pentaphylla* CORR., or *Clausena dentata* var. *robusta* TANAKA, is occasionally noticed. It is unquestionable that this tribe has manifold relationship to other tribes as shown by various instances, such as the great resemblance of *Aeglopsis* with *Pamburus* (Tribe *Lavangeae*) in the nature of the leaf and thorn, *Balsamocitrus* with *Lavanga* (Tribe *Lavangeae*) in various characters, and *Swinglea* with *Pleiospermium* (Tribe *Lavangeae*), also in general characters and especially in the shape and construction of the pistil. The tribe is divided into four subtribes: (1) *Merrillinae*, having alternately pinnate leaves with narrowly winged rachis, normal filaments, a long-stalked and many-ovuled quinquelocular ovary, (2) *Feroniinae*, having oppositely pinnate leaves with or without wing upon the rachis, slightly narrowed ovary at the base, appendaged filaments, and five, finally uniting locules, (3) *Balsamocitrinae*, having unifoliate or trifoliate leaves with unwinged or rudimentally fringed petiole, normal filaments, and a more than 6-loculed ovary sitting on the distinct disk, and (4) *Swingleinae*, having trifoliolate leaves with narrowly fringed petiole, normal filaments, stalked hairy ovary with many locules, and numerous hairy seeds. The double number of filaments is found in *Feroniella* and in the subgenus *Afraegle* of the genus *Balsamocitrus*, but stamens are very numerous in *Aegle*. Hairiness of seeds is only found in *Aegle* and *Swinglea*.

It is next obvious that the main line of the subfamily, with soft-skinned fruits, develops into the oppositely pinnate-leaved Section *Aurantieae*, but there is a large side line which has a consistent tendency of reducing the number of leaflets. Among the latter, the tribe *Lavangeae* is related in many ways with the former tribe *Aegleae* in habit, as mentioned before, and the climber genus *Lavanga* has more or less hardened fruit rind. Obscurity of venation of leaves is also found in both tribes, as instanced by *Balsamocitrus Dawei* STAPF, *Aeglopsis*, *Pamburus* and *Lavanga*.

Trifoliolate-leaved members predominate in the tribe, but *Pamburus* and *Pleiospermium littorale* TANAKA have unifoliate leaves. All members of this tribe have an ovary with 2 to 3, or 4 to 5 locules, each containing 1 to 2 ovules. *Lavanga* still has superposed ovules, and *Pleiospermium* has collateral or obliquely superposed ovules. The tendency of reducing the number of leaflets, however, develops into the large unifoliate group including three closely related tribes *Meopeae*, *Atalantieae* and *Microcitreae*, which are rather greatly divergent from the pinnate-leaved

group, descended straight forward from *Clausena*. Among these tribes, trifoliolate members rarely occur, as *Triphasia trifolia* P. WILS., but it does not amount much, as *T. grandiflora* MERR. of the same genus, is distinctly unifoliolate. The big difference of the tribe *Meropeae* from the tribe *Lavangeae* is the reduction of the number of flowers, but still a great majority of the genera of *Meropeae* have a 3- or 5-loculed ovary with one or two ovules, except in *Wenzelia*, which has locules more than 5 and biseriate ovules. Obscure venation of leaves is also frequent in the tribe *Meropeae*, though the general appearance of the genus *Wenzelia* very much approaches *Monanthocitrus* of *Microcitreae*. Binary thorns frequently occur in this tribe (*Triphasia* and *Echinocitrus*), but single thorns, either straight or curved, are also frequently seen. The genus *Paramignya* has a 3—5-loculed ovary with obliquely superposed ovules, somewhat like the case of *Lavanga*, and it is curious that both are climbing vines with curved simple thorns. No increase in the number of stamens and the formation of pulp-vesicles is found in this tribe.

In the next tribe *Atalantieae*, paniculate inflorescences predominate and still the unifoliolate tendency is very strong. Venation of the leaf is quite different from the former tribes, as veins are very frequently forming parallel netting. This characteristic is bringing down into the next tribe *Microcitreae*. In these tribes, pulp vesicles develop commonly, except in *Oxanthera*, in which stamens count more than ten and locules, more than five in number, containing many ovules, as in *Citrus* and its near members. Simple thorn predominates in these two tribes, but binary thorns are seen in *Monanthocitrus* and *Pleurocitrus inodora* TANAKA (*Citrus inodora* BAIL.).

Coming back from these unifoliolate tribes, the pinnate-leaved tribe *Aurantieae* plays an important role to the further development of the subfamily. This tribe is characterized by the great development of oil cells on the ovarial wall, common presence of wings on the rachis and petiole, and distinct broad reticulation of the leaf. Its subtribe *Hesperethusinae* is linked to certain extent to *Clausena* in having subulate filaments, thick short anthers, and dwarf styles, but it approaches more closely the African subtribe *Citropsinae*, having similar oppositely pinnate leaves, and a large oil-celled ovary containing a single ovule. The latter tribe approaches in turn to the subtribe *Citrinae* quite closely, in the leaf characters, vesiculate locules, and even in grafting affinity. The reduction of the pinnae in *Citropsis* is quite frequent, and even a unifoliolate species was found (*Citropsis citrifolia* TANAKA), which looks almost like *Citrus* in general appearance. Even in *Citrus*, trifoliolate individuals are occasionally found,

and from the progeny of a cross between *Citrus* and the trifoliolate genus *Poncirus* (Subtribe *Poncirinae*), a pinnate-leaved individual has arisen, so that the subtribe *Citrinae* probably has a pinnate-leaved member, like *Citropsis*, as its near ancestor. The paniculate inflorescence is also bringing down into a group of *Citrus* (Subgenus *Archicitrus*), and the solitary-flowered genera *Poncirus* and *Fortunella*, as well as a similar group of *Citrus* (Subgenus *Metacitrus*), are unquestionably later creations, as in the quite analogous case of *Severinia* versus *Atalantia*, with respect to the lack of paniculate inflorescences. It is also interesting to note that these solitary-flowered members are geographically more subordinate to China than to India. Double thorns are still present in *Citropsis* and no increase in the number of filaments occurs, though pulp vesicles are more or less well developed. This again tells, as in the case of *Oxanthera*, that the increase of the number of filaments, ovary and ovules, does not go parallel with the formation of the pulp vesicles. Members having tetramerous floral organs are common in *Clausena*, but these characteristics become essential in *Hesperethusa*, *Citropsis* and certain sections of *Citrus* (Subgenus *Archicitrus*, Section *Papeda* and Section *Cephalocitrus*).

With *Citrus*, the following systematic status can be given:

- (1) In both paniculate and solitary-flowered subgenera, large-winged sections are most primitive, (Section *Papeda* versus Section *Osmocitrus*) and both have broadest wild distribution.
- (2) From a geographical standpoint, *C. macroptera* MONT. is oldest in existence, as it nearly reaches Australia, where no *Citrus* occurs. *C. hystrix* DC. has narrower distribution and *C. latipes* TANAKA only occurs in the Eastern Himalaya.

These three represent the Section *Papeda*, with distinct inflorescences, but the following species represent the Section *Osmocitrus* having solitary flowers. *C. junos* SIEB. ex TANAKA has broadest wild distribution among all *Citrus* fruits found in China: It reaches almost the Burmese frontier and runs along the Yangtse River region, where *C. ichangensis* SWINGLE appears in smaller area.

- (3) The lime (Section *Limonelles*) and the shaddock (Section *Cephalocitrus*) are closely related to the *Papeda*, and all are very similar in climatological requirement.
- (4) The lime, *C. aurantifolia* SWINGLE, most frequently occurs wild in Southern India Peninsula. The shaddock, *C. grandis* OSBECK, occurs wild in eastern Himalaya, Burma, and perhaps in Yunnan. Both have no characteristic companions of distinct geographic

independence, but local species are very abundant both wild and cultivated. The grape fruit from Barbados, *C. paradisi* MACR., is the most characteristic cultigen derived from the latter.

- (5) The lemon and citron (Section *Citrophorum*) are rather far from the above given fundamental groups, only related to the lime in fruit characters, though leaves and flowers are entirely different.
- (6) The citron, *C. medica* LINN., and the Canton lemon, *C. limonia* OSBECK, have almost identical distribution as the shaddock, and they have rather few derivations, except such well known species like the Florida rough lemon, *C. jambhiri* LUSH. of India, which is the nearest relative of the latter. The lemon, *C. Limon* BURM. F., grows wild in the Western Himalaya, and the sweet lemon, *C. limetta* RISSO, is amongst its few relatives mostly of garden origin.
- (7) The sour and sweet oranges (Section *Aurantium*) are not so distinct from the shaddock in the flower and the fruit. Development of carotinoid pigmentation in this section is greater than in the preceding ones.
- (8) The sour orange, *C. Aurantium* LINN., and the sweet orange, *C. sinensis* OSBECK, grow wild in the Eastern Himalaya, and the latter probably reaches down to Burma and Yunnan. The former has a great number of derivatives in gardens, especially with the presence of the shaddock in the same locality. Natural crossings between them seem to be most easy, giving rise to distinct cultigens. Local wild species are also not uncommon, as in the case of *C. miaraya* WESTER and *C. taiwanica* TANAKA & SHIMADA. The Tankan of South China and Formosa, *C. tankan* HAYATA, is one of the very few derivatives of the sweet orange.
- (9) The solitary-flowered *Citrus* (Subgenus *Metacitrus*) are all loose-skinned, but the big-winged Section *Osmocitrus* can be excluded from the true loose-skin oranges (Section *Acrumen*), by having very large seeds with nearly white cotyledons and by a very distinctive aroma of the rind. In *Acrumen*, we see again the great development of carotinoid pigmentation.
- (10) Very imperfect knowledge of the true loose-skin oranges (Section *Acrumen*) has caused in the past a great misunderstanding about the bearing and the nomenclature of the Linnean species in *Citrus*. It should be borne in mind, that a name like *C. nobilis* LOUR., should be limited to the cultigen first described by LOUREIRO at Hué in Annam, now known under various names as king orange, Kunembo or Pentikuang in America, Japan and China.

- (11) The king orange represents the large-flowered *Acrumen* (Subsection *Euacrumen*), resembles the Section *Aurantium* by the large-winged leaves and comparatively thick rind of fruits, but its fruits are oblate and the cotyledons are not purely white. *C. unshiu* MARC. is another well defined cultigen of the same section.
- (12) The small-flowered *Acrumen* (Subsection *Microacrumen*), are more distinct in having a ramose bushy habit, wingless smaller leaves and deep green cotyledons. It approaches *Fortunella* through the Subsection *Pseudofortunella*, having leaves with obscure venation, and the fruit with sweet rind.
- (13) There are very abundant indigens and cultigens of the subsection *Microacrumen* which includes many important indigenous species so far almost entirely neglected. The identification and the determination of the limit of species of this subsection are extremely difficult, but it is very clear that this can be settled by measuring the boundary of species by means of studying closely resembling wild species, having no identity in detailed characters and occurring with geographical independence. For this investigation, *C. tachibana* TANAKA and *C. depressa* HAYATA, growing wild in Japanese territory, will present an ideal example. The former is the species north of Sambok (Amami Oshima) and the latter is distributed in Luchu south of Sambok. Both are distinct in the shape of the leaf, the shape and colour of the fruit, and the number of locules, and they are all different in minute characters of the pulp vesicles, carpel wall, integument of seeds, and so on. But they are so close that still greater difference can be set forth, between many wild and cultivated units of the subsection. Among very simple *Microacrumen*, resembling these two species, clear specific distinction can be made, if the natural compass between the species of *Citrus* is concluded to be so narrow as shown by the example mentioned above. Among such small wild or semi-wild *Microacrumen*, one can enumerate Djeroek ragi of Java, *C. crenatifolia* LUSH., and Djeroek limoh of Java, *C. amblycarpa* OCHSE, or three distinct primitive cultigens of Southern China and Formosa, *C. sunki* HORT. ex TANAKA, *C. ponki* HORT. ex TANAKA, and *C. oleocarpa* HORT. ex TANAKA. Many other cultigens, widely divergent from these, of course, should be regarded as independent species, among which the Nagpur Suntara of India (Ponkan of Formosa), *C. poonensis* HORT. ex TANAKA, the Michieh or Kishu-mikan of China and Japan, *C. kinokuni* HORT. ex TANAKA, the

Fuchieh or Dancy tangerine of China and America, *C. tangerina* HORT. ex TANAKA, etc., have very important systematic and economical significance.

- (14) The subsection *Pseudofortunella* is represented by a single well-founded species, *C. microcarpa* BUNGE, which is probably the most recent creation among *Citrus*, by having natural tetraploid variety.
- (15) The genus *Fortunella* is characterized by smaller stature, smaller flowers and leaves exuding resinous substance underneath, greatly reduced number of carpels, sweet rind, and intensely green cotyledons.
- (16) The common Kumquat orange belongs to the subgenus *Eufortunella*, which has two distinct wild members, *F. japonica* SWINGLE and *F. polyandra* TANAKA. Three cultigens, *F. margarita* SWINGLE, *F. crassifolia* SWINGLE, and *F. obovata* HORT. ex TANAKA, are also well defined. It is quite interesting to note that the most primitive-looking species, *F. Hindsii* SWINGLE, forming the monotypic subgenus *Protocitrus*, is the only tetraploid natural species of the *Citrus* fruits.

Judging from these facts, above mentioned, the systematic status of the *Citrus* fruits can be concluded as follows:

- (1) All members of *Citrus* should be named properly, for the species formation in *Citrus* through the process of compound hybridity (Zygotaxis), occurs both under wild or cultivated condition, in equal opportunity and frequency.
- (2) Although all representatives of the systematic sections of *Citrus* and *Fortunella* are found wild by the author's identification, minor species systematically unimportant also occur wild. More important members occur in cultivated condition, so that the question of wild and garden origin of species in *Citrus* does not mean much systematically to their validity as Linnean species. Naming of garden species (cultigens) is just as important as naming wild species (indigens), and in fact most of the present standard species have been named originally from gardens.
- (3) From geographical and taxonomic evidence, it is logical to state that the limitation of species in *Citrus* is extremely narrow-compassed and the grouping of these species into a few broad-compassed imaginary species is not permissible, as such must stand as a section or subsection of the genus.

- (4) All local Citrus fruits in the far East should be mobilized, properly classified and described, otherwise it is impossible to make the Citrus flora of these regions systematically clear. No identification of Citrus species can be made without the proper nomenclature of these numerous independent species.
- (5) The hesitation of naming these distinct units of the genus prevents the increase of knowledge of Citrus fruits and checks the progress of Citrus industry, as the cultural requirements of these species, especially in the scion-stock relationship and the disease resistance, are entirely different.

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BIBLIOGRAPHICAL AND MISCELLANEOUS NOTES.

C. G. G. J. VAN STEENIS, *Maleische Vegetatieschetsen — Toelichting bij de plantengeografische kaart van Nederlandsch Oost-Indië* (Sketches of Malaysian vegetations — Comments to the phytogeographical map of Netherlands East India) — Reprinted from the „Tijdschrift van het Koninklijk Nederlandsch Aardrijkskundig Genootschap“, Ser. II, Vol. 52, Jan.-March-May 1935, 112 pp. (repagination [Pages in the original: 25—67, 171—203, 363—398] with 46 photographs, 36 of which in the reprint only, and a phytogeographical map. The reprint preceded by a short preface, a (too) short index and a dedication to FRANZ JUNGHUHN „as a memory to his arrival in Java, one hundred years ago“).

It is a great pleasure to me indeed to announce here, more particularly on behalf of those readers who are not familiar with the Dutch language, this excellent work on the phytogeography of Malaysia, published in the Journal of the Royal Netherlands Geographical Society and therefore, moreover, likely less accessible to many botanists abroad. The author has, though only about 6 years engaged in botanical work in the tropics, gathered a remarkably thorough knowledge of the rich flora of this region, no doubt one of the most interesting ones, from a biogeographic standpoint, on earth. As the phytogeography of these parts has mostly, since JUNGHUHN's „Java“ (1854), been only dealt with in scattered papers, VAN STEENIS has in the publication under reference, as well as in some others that preceded it¹), done a pioneer work in his attempt to give a comprehensive and more or less complete survey of the current problems. Our gratitude and admiration is not in the least diminished by the fact that this work shows certain traces of cursoriness and dis-equilibrioness, as well as a certain want of continuity and well-ponderedness. These features are mostly inherent to all pioneer work and the author himself states in the preface, that this work is meant as a provisional publication; this is in accordance with the title, which, by the way, could have been more adequately chosen, e.g.: Materials to Malaysian Phytogeography („Maleische“ is, in my opinion, in Dutch a less felicitous word). Indeed, this paper contains a great many informations and stimulating ideas, and moreover, an almost complete bibliography, also of many papers in Dutch. It may be supposed indeed that there is, at present, hardly any other botanist available who is more capable than VAN STEENIS to continue this work and to prepare, some time, a complete „Phytogeography of Malaysia“, to which we are looking forward with great interest.

¹) More or less preliminary studies by the same author are to be found in: Bull. Jard. bot. Buitenz., Sér. III, 12, 1932, 151—211 (Anambas and Notoena Islands).

Ibid. 13, 1933, 1—56 (S. Sumatra).

Ibid. 13, 1934—'35, 135—262 and 289—417 (On the Origin of the Malaysian Mountain Flora; equally a publication of great importance and with numerous references).

We dispose now of a great number of data, though still more or less in the form of scattered annotations. Yet, VAN STEENES has endeavoured to go farther and to give a frame work; how far he has succeeded therein, will be discussed below.

To begin with, these „sketches” are meant to elucidate the first detailed vegetation map of Malaysia ever made. This map is a reprint of sheet 7 (the first one to be issued) of the „Scientific Atlas of the Tropical Netherlands” in 31 sheets, prepared by the Royal Netherlands Geographical Society. This sheet, 37½ by 59 cm in size, contains a physiognomic vegetation map of Netherlands India 1:10 000 000 and, besides 9 faunistic and 4 meteorologic cartoons, 3 cartoons with plant area's and 1 (of Java only), indicating the correlations of some plant area's (and also of tea plantations) and drought distribution in the year (severity of the dry season).

The text is divided into two parts, a general one and a special part. The general part contains 9 paragraphs, each with a bibliography (par. 6 even with 96 numbers). Their contents are not always very well coordinated and it is especially this part which, in spite of its remarkable fullness of data, leaves us somewhat unsatisfied by its want of surveyability. The paragraphs are respectively dealing with: 1. an introductory; 2. the origin of the map; 3. remarks on earlier vegetation maps of the region in question; however, only world maps are quoted, on which Malaysia forms only a small part, but — it must be admitted — having almost always been dealt with most inaccurately; 4. the fundamentals and sources to the map, taken from literature as well as from oral and written information from many sides, and particularly from information largely procured by the intensive cooperation of the Forestry Service. In this paragraph an introduction is given to 5. in which 175 vegetation-types have been enumerated, that have been dealt with more in detail in the special part (called „regional descriptions” by the author). As I have to put forward some objections to the arrangement of these vegetation-types at some length, I will postpone their discussion now; 6. general (better: miscellaneous) remarks on various subjects, such as local flora's and vegetations, many interesting informations on and a map of the forests in Netherlands India (forest-storeys, composition, elements), the influence of man (forest products, culling, cultivations, fires [also by lightning]), reforestation, altitudinal zones; 7. remarks to the map; 8. soil and flora, containing some data on the correlation of edaphic factors in general and plant distribution (lime, halophytes, soda, silica, clay, loam, etc.); 9. correlation of climate and flora in Java, text to elucidate the cartoon, mentioned above. The paper on this subject by the referent (Blumea I, 1934, 120—123), not mentioned by VAN STEENES, has apparently been received too late to be dealt with. This paragraph contains a discussion on the distribution of some cultivated plants (sugar cane, tea) as well as some wild plants (*Andropogon contortus*; *Nepenthes gymnamphora*, with map).

The special part is numbered par. 10 and contains more or less detailed descriptions, with eventual references, of the vegetation-types, enumerated in par. 5. I have now to discuss their arrangement and subdivision, which we may suppose to be meant as a tentative scheme or frame-work to serve as a basis for future work. The first subdivision is based upon whether the vegetation is natural or artificial:

1—101 „natural” vegetations (cultivated forests of teak, sagu etc. incl.).

2—15 grass, fern and shrub jungles

20 second growth forests

30—101 primaeval forest

150—175 artificial vegetations (cultivations).

The author means to leave open the possibility to intercalate thusfar unmentioned vegetations, having only enumerated a limited number in the scheme given. His subdivision runs therefore e. g.

1. „jungles” in general
 2. jungles of shrubs, grasses or ferns
 3. litoral zone
 4. beach zone
 5. dunes (also inland dunes)
 6. freshwater vegetations
 - etc. as far as
 15. savannah-like vegetations
 20. second growth forests (no subdivision)
 30. other, mostly older forests
 31. palm forests
 32. Nipa
 33. sagu
 - etc. to
 39. Borassus
 - 39a. Corypha
 - 39b. Livistona
 - 39c. Pinanga
 40. Casuarina
 41. Coniferous forests
(subdivision 42—47).
 48. Bamboo forests
 49. Pandanus
 50. Fern trees
 55. Leafwood forests
 56. Forests of deciduous trees
 57. Heterogeneous
 58. Teak forests
 60. „Evergreen” forests
 61. Heterogeneous
 62. Tidal forests
(subdivision 63—66)
 70. Dipterocarpaceous forests
(subdivision 71—77)
 - 80—101. Several dominating trees
(genera or species)
150. Cultivated grounds
etc.

I have mentioned this statement at some length, because in my opinion it fails in the present state of plant physiognomy and sociology, to satisfy legitimate demands of logic and surveyability. In the above statement 1 stands opposite to 150. The latter number has apparently been chosen, since the next lower one was 101; had this been, say 95, then the second category would have probably started with 100. Now 2 is equivalent (or printed in such a way that it seems equivalent) with 20, 30, 40, 41 etc., however, 3—15 with 31, 56 and 60, 32—39c and 42—47 with 57, 58, 61, 62, 70.

80—101, and 63—66 finally with 71—77. I think, there is a lack of uniformity and adequate subordination in this system, which might have been avoided, if the decimal system had been used, which is sometimes used in bibliography. This system allows a more logical and equilibrated subdivision and can always be applied in such a way that intercalations are feasible without additions of *a*, *b*, *c* etc. (cf. 39). Of course, it is not necessary to go so far as to use such a decimal system in connection with that, proposed for libraries in which¹⁾:

- 5 = Science
 - 58 Botany
 - 58.1 Phytobiology (sic!)
 - 58.19 Phytogeography
- and e. g.
 - 9 = History and Geography
 - 91 Geography
 - 922 Java
 - 922.1 West Java
 - etc.

On the contrary, I think it is practically impossible to use more of this apparently not very successful scheme than the primary idea and the arrangement of the groups could then be based upon such factors as altitude, climate, soil, etc., etc. If we take VAN STEENIS's own paper on the mountain flora, quoted above (p. 327), as a basis, the number of zones indicated there being only 7, we need not commence with 0, thus using the numbers 1—7, e. g. in the following (or any other) way:

1. Marine Zone (alt. —5 to —0.25 m)
 11. alt. —5 to —1 m (*litoral zone*)
 111. Algae
 - 1111, 1112, etc. (various types)
 112. Phanerogams
 - 1121, 1122, etc. (various types)
 113. etc.
 12. alt. —1 to —0.25 m (*mangrove*)
 121. Rhizophora
 122. Bruguiera
 123. Avicennia
 - etc.
2. Tropical zone (alt. 0.25—1000 m)
 21. alt. 0.25—1 m (*beach weed flora*)
 - 211, 212, etc. (various types)
 22. alt. 1—5 m (*beach forest and dunes*)
 211. beach forest
 - 2111, 2112, etc. (various types)
 212. dunes
 - 2121, 2122, etc. (various types)

¹⁾ cf. H. J. VAN LUMMEL en L. VAN VUUREN, Meded. Encyclop. Bur. N. I. 13, 1917, 169—314 and I—XVI (*Literatuurstudie van Halmahera*).

- 23. alt. 5—500 m (*lowland zone*)
(many subdivisions possible)
- 24. alt. 500—1000 m (*colline zone*)
(many subdivisions possible)
- 3. Submontane zone (alt. 1000—1500 m)
etc. to
- 7. Nival zone (alt. 4600—5000 m)

It is not my intention to criticize here the above zonation; I would only suggest the author to consider the practical possibilities of this scheme, which is, I think, elastic and simple. I would add the suggestion that, as far as possible, sociological or ecological subdivisions should be given preference above floristic ones and that the final scheme be established in such a way that minor alterations may be made for many years to come without affecting the general principle and the main subdivision chosen.

I have little to add concerning the regional description of the second part. An astonishing great number of interesting and very different items has been gathered here. To some of the paragraphs some additional or correcting remarks could be made (and the author recommends himself to be presented with such informations), but here that would be throwing water into the Thames. Some paragraphs are more elaborate, others refer only to one dominating species or to literature, but together they form a wealth of information, on which both the author and the reader may be congratulated. The photographs are, with few exceptions, good and representative; eight of them are splendid large-size brown reproductions with a very minute lath.

The map and the cartoon are carefully prepared, drawn and printed. It is striking to observe how little forest is left in a part of N.E. Sumatra and W. Borneo, and especially in Java, Bali and Lombok. Large areas are covered with secondary forest in Sumatra, with teak in Central Java. Dominating species in primeval forests (*Dipterocarpaceae*, *Agathis*, sagu, *Pinus*, *Melaleuca*) are indicated by various kinds of hatching. As to New Guinea, the map does not agree in some details with that, prepared by the referent some time ago (Blumea I, 116—117 and in „Nieuw-Guinee” I, 1935, 200—201), but it must be admitted that our knowledge of that immense island is still too scanty to attach much weight to such differences. It is, I think, to be regretted that the same (yellow) colour has been chosen for all open vegetations („shrub, grass and fern jungles”), whether in the lowland (except the savannah's, which are dotted) or in the subalpine zone.

As a matter of course, the area cartoons could only give an extremely scanty selection from the data available. Almost every individual writer would have made a different choice, and also that of VAN STEENIS has a personal character, but it gives several representative and remarkable examples.

H. J. LAM.

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W. M. DOCTERS VAN LEEUWEN, *Krakatau 1883—1933*, *A. Botany* — Ann. du Jard. bot. de Buitenzorg 46 and 47, May 1st 1936 — XII + 506, with a frontispiece, 10 text figures, 60 photographs and a map.

Fifty years after the event that was almost as important and searching to

biologists as it was to volcanologists, we are glad to dispose of two authoritative and exhaustive publications on what happened with the flora of Krakatau, one by A. ERNST (Vierteljahrsh. Naturforsch. Ges. Zürich, Dec. 31st, 1934) and the other by W. M. DOCTERS VAN LEEUWEN. ERNST, the European University professor, transient visitor twice, unconcerned and mastering modern botany in its full extent; DOCTERS VAN LEEUWEN, with a long tropical career, experienced field botanist (and zoologist), retired director of the Botanic Gardens at Buitenzorg and investigator for many years and many a long day. These two men well complement each other and it may be accepted that, being published with an interval of little more than a year, their publications seclude a period of investigation, publication and contention. For many decades to come little is left to be said on the problem as it was; there only remains to tell how things will gradually change and develop. Every side of "The Problem of Krakatoa, as seen by a botanist" has been thrown light upon, more impartial and less one-sided than has been done by the third man who gave an extensive contribution, with the title just quoted, C. A. BACKER. If the contest has ended now, as may be hoped, both ERNST and DOCTERS VAN LEEUWEN have dignifiedly contributed to bring back the problem to its essential proportions. I reviewed ERNST's paper (Vakblad voor Biologen 16, 1935, 161—166) and I will therefore refrain from discussing in detail the work of DOCTERS VAN LEEUWEN, in order that I need not deal with the same questions twice. Yet, nobody who is interested in the problem, can venture to do without either of the two publications referred to. The fulness of personal impressions gives DOCTERS VAN LEEUWEN's work an attractiveness and a value that cannot be surpassed by anybody else. It deals with a subject, treated at length shortly before, but it is of a very personal nature, containing all known particulars of the volcano before and after the famous eruption, comparative studies on similar events, a complete history of the research, to which the frequent experiences of the author yield a very vivid character, interesting chapters on dispersal, on sociology and successions, and on the new-born „Anak Krakatau", and finally a complete and reasoned enumeration of all Zooecidia, Bryophytes (33 + 38), Pteridophytes (61) and Spermatophytes (263), some time collected or observed on one of the isles.

An extensive bibliography (12 pp.) and an index (18 pp.) precede a series of splendid photographs. The publication ends with a map in black without many particulars, perhaps the only disappointment in this important and well-edited work. I would have preferred to have inserted, in addition to a small-size general map, coloured vegetations maps of the separate islands with the indication of the altitudinal zones in various phases of development.

H. J. LAM.

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Podostemonaceae in New-Guinea?

The Podostemonaceae are a plant family that has apparently originated in tropical America, as is well pointed out by F. A. F. C. WENT (1). Its generic and specific density diminishes towards the East and at the same time its differentiation (specialization, reduction) increases. Thus far, the eastern boundary of its area is found in S. Japan (Kyu-Syu), Indo-China, an island off the Siamese coast, a

doubtful habitat in the Philippines, and finally S. Celebes and E. Java (*Cladopus Nymanii* MÖLL.).

Now some time ago my attention was drawn by a passage in D'ALBERTIS's well-known narrative: „New Guinea: What I did and what I saw” (Vol. II, 1880, 93), on his exploration of the Fly River in S. New Guinea, running:

„Today (June 17, 1876) I met, for the first time, with a plant which I must call extraordinary. It grows on the heaps of stones that abound in the river, and seen from a certain distance, its dark colour, almost black, and its peculiar shape, makes it resemble the scales of a serpent. Its branches lie flat, so as to offer as little resistance as possible to the water. It owes to this curious conformation its power of resisting the strength of the current”.

I wonder whether something else can be meant here than podostemonaceous plants. The author being a zoologist, his plant and vegetation descriptions are not always very elaborate and hard to interpret. But, if we remember, how long *Cladopus* has remained unknown in a relatively well-investigated country as Java (MÖLLER and NYMAN discovered it only in 1897 and it has even been detected near Buitenzorg in — I understand — 1929), and if we further bear in mind that still more eastern species may eventually be still more reduced in size, it seems not at all impossible that New Guinea rivers contain a representative of this remarkable plant family, the distribution of which is very important for historical phytogeographical problems, since it merely contains highly adapted freshwater plants. Let me make two quotations from WENT's paper (1):

„Even granting that the possibility exists of the discovery of one of these small species on New Guinea or on one of the islands of the Pacific, I rather think that this is not very probable” (p. 1906) and

„the flora of many islands in the Pacific is known only incompletely, so, it is possible, if indeed not probable, that Podostemonaceae may be detected there, especially because these small forms are easily overlooked, or taken for liverworts. Accordingly, I would urge those botanists, who study the flora of the Pacific Islands to keep a sharp lookout for Podostemonaceae, because their occurrence would compel us to alter our ideas as to the age of the Pacific Ocean.” (p. 1911).

May I, in addition, and particularly in view of D'ALBERTIS's observation mentioned, suggest that Australian or other explorers look out for these plants, as the opportunity occurs? I would also be obliged to learn additional informations, eventually known to other people.

The above had been set up in type, when a small paper by VAN STEENIS on “The Podostemonaceae of the Netherlands Indies” (Bull. du Jard. bot. de Buitenzorg, Sér. III, Vol. XIII, 530—534, July 1936) was received by me. The area of the order, mentioned there, agrees pretty well with that given above but for the remarkable habitat of *Torrenticola* DOMIN, an unsufficiently known genus from Queensland¹⁾. DOMIN's description is not available to me, but A. LEMÉE writes (Dict. descr. et syn. VI, 1935, 625): “*T. queenslandia* (*sic*) Domin, d'Australie, forme sur les rochers de petits „thalles étroits entiers à aspect de Fucus qui sont abondamment couverts de courtes

¹⁾ ENGLER-DIELS, Syllabus der Pflanzenfamilien, 11th Ed. 1936, 185, mentions Australia also.

„pousses flottantes densément feuillées”. Could it be possible that D’ALBERTIS observed a representative of this genus in the Fly River region?

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THE UMBELLIFERAE OF THE NETHERLANDS INDIES

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Besides the *Umbelliferae* of the Netherlands Indies proper, also those of the Malay Peninsula and the non-Dutch parts of Borneo and New Guinea have been taken up in this revision. The materials examined belong to the following Herbaria:

- (B) = the Herbarium of the Botanic Garden, Buitenzorg.
- (BD) = the Herbarium of the Botanical Museum, Berlin—Dahlem.
- (BM) = the Herbarium of the British Museum of Natural History, London.
- (E) = the Herbarium of the Botanic Garden, Edinburgh.
- (G) = the Herbarium of the University, Groningen.
- (K) = the Herbarium of the Botanic Gardens, Kew.
- (L) = the National Herbarium (Rijksherbarium), Leiden.
- (NY) = the Herbarium of the Botanic Garden, New York.
- (Pa) = the Herbarium of the Java Sugar Experiment Station, Pasoeroean.
- (S) = the Herbarium of the Botanic Gardens, Singapore.
- (Sa) = the Herbarium of the Sarawak Museum, Kuching.
- (U) = the Herbarium of the University, Utrecht.

Most of the herbarium materials were sent to Groningen to be examined there. Moreover I had the opportunity to work a few weeks in the Kew Herbarium and in that of the British Museum of Natural History in London.

I render my best thanks to the Directors and Keepers of all these Herbaria for their kind assistance.

Umbelliferae.

For the delimitation and arrangement of the genera this paper follows, without criticism, DRUDE's system as given in *Die Natürlichen Pflanzenfamilien*, III, 8. Therefore it appeared useless to recount the characters of the genera. For those who prefer to determine the genera in the most correct way, *viz.* with help of the anatomy of the fruit, I must refer to DRUDE's excellent key *l. c.* p. 114—115. As none of the

genera has its centre of development in the Malay Archipelago, the lists of synonyms and literature are restricted to the most necessary data.

As a result of this revision, 43 species, belonging to 22 genera, appear to occur in the area considered. Of these species, 16 are cultivated, *viz.* those of *Chaerophyllum*, *Coriandrum*, *Cuminum*, *Apium*, *Petroselinum*, *Trachyspermum*, *Cryptotaenia*, *Carum*, *Foeniculum*, *Anethum*, *Pastinaca*, and *Daucus*, moreover *Trachymene caerulea* and *Pimpinella Anisum*. Of all these species only *Foeniculum vulgare* and *Daucus Carota* appear to be naturalised in few localities in Java. *Eryngium foetidum* is a weed introduced from America, but is entirely naturalized now. The case of *Torilis japonica* is doubtful. Perhaps it has been introduced from temperate regions, perhaps its area of distribution is entirely natural and reaches from temperate Asia, over a part of tropical Asia, as far as Java. The remaining genera are really indigenous, *viz.* *Hydrocotyle*, with 3 species; *Centella*, with 1 species; *Trachymene*, with 13 species; *Sanicula*, with 1 species; *Oreomyrrhis*, with 3 species; *Pimpinella*, with 2 species; *Oenanthe*, with 1 species; *Heracleum*, with 1 species, together 25 species. They may, after their total area of distribution, be divided into three groups. The first group is that of *Hydrocotyle* and *Centella*, widely spread north and south of the Malay Archipelago and occurring at low as well as at high elevations. The second group is that of the genera of Asiatic origin. They are chiefly mountain plants of the western parts of the Malay Archipelago, *viz.* *Sanicula*, spread in eastern direction as far as Timor and Séran; *Pimpinella*, only found in Java and Bali; *Heracleum*, found in Sumatra on one mountain only; moreover *Oenanthe*, spread throughout the area, and even occurring in Queensland. The third group is that of *Oreomyrrhis* and *Trachymene*, having their centre of development in Australia, but protruding far northward, *Oreomyrrhis* as far as Mt. Kinabalu in Borneo, *Trachymene* as far as the island of Mindoro in the Philippines. They are mountain plants, chiefly of the eastern parts of the Malay Archipelago.

Key to the genera.

- | | |
|---|--------------------|
| 1 Flowers in simple umbels or heads that often are united in more compound inflorescences, but not in compound umbels | 2 |
| Flowers in compound umbels that sometimes are united in more compound inflorescences | 7 |
| 2 Leaves and involucre prickly. Flowers in heads. | 5. <i>Eryngium</i> |
| Leaves and involucre not prickly. Flowers in umbels | 3 |

- 3 Fruit with uncinatè bristles 4. **Sanicula**
 Fruit not with uncinatè bristles 4
- 4 Fruit laterally flattened, not longer than broad 5
 Fruit not laterally flattened, more than twice as long as broad 9. **Oreomyrrhis**
- 5 Mericarps 3-ribbed 6
 Mericarps 7—9-ribbed, with connecting veins between the ribs 2. **Centella**
- 6 Leaves without sheaths, but with distinct, entire stipules. Corolla valvate
 1. **Hydrocotyle**
 Leaves with sheaths, with or without lacerate stipule-like appendages. Corolla
 imbricate 3. **Trachymene**
- 7 Mericarps winged at the margins 8
 Mericarps not winged at the margins 10
- 8 Fruit strongly dorsally flattened, not longer than broad. Leaves pennate to
 bipennate, the extreme segments oblong-ovate 9
 Fruit not strongly dorsally flattened, more than twice as long as broad. Leaves
 tripennate, the extreme segments nearly filiformous 19. **Anethum** *)
- 9 Ovary hairy. Corolla white or reddish, radiating 21. **Heracleum**
 Ovary glabrous. Corolla yellow, not radiating 20. **Pastinaca**
- 10 Fruit laterally flattened. Leaves not compound, roundish in outline
 1. **Hydrocotyle**
 Fruit not laterally flattened. Leaves usually compound 11
- 11 Fruit with a sterile neck or short beak, that is visible on the ovary as a
 dark-green ribbed neck 6. **Chaerifolium**
 Fruit without sterile neck or beak 12
- 12 Calyx teeth distinct 13
 Calyx teeth not distinct 16
- 13 Ovary and fruit bristly 14
 Ovary and fruit entirely glabrous 15
- 14 Fruit with uncinatè bristles. Stems and leaves hairy. Leaf segments not
 very narrow. Flowers not radiating 7. **Torilis**
 Fruit with stellate hairs. Stems and leaves glabrous. Extreme leaf segments
 linear to filiformous. Flowers radiating 10. **Cuminum**
- 15 Mericarps hollow at the inside. Primary ribs visible as undulate lines, secondary
 ribs somewhat more prominent. Flowers radiating 8. **Coriandrum**
 Mericarps not hollow at the inside. Marginal ribs thicker than the lateral
 ones, secondary ribs none. Flowers not radiating 17. **Oenanthe**
- 16 Ovary and fruit entirely glabrous 17
 Ovary and fruit bristly, hairy, or with scale-like trichomes 21
- 17 Leaves ternate. Umbels and umbellules few-rayed 14. **Cryptotaenia**
 Leaves pennate or bipennate 18
- 18 Flowers yellow or yellowish-green 19
 Flowers white or reddish 20
- 19 Involucels many-leaved. Leaves 3—4-pennate with nearly filiformous extreme
 segments 18. **Foeniculum** *)
 Involucels 0—2-leaved. Lower leaves tripennate with leaflets obovate or
 cuneate 12. **Petroselinum**

- 20 Ripe fruit 1.5—2 mm long and broad, roundish when seen from aside.
 Carpophore entire or very shortly bifid at the apex . . . 11. **Apium**
 Ripe fruit 4—5 mm long and half as broad. Carpophore bifid to nearly
 two-thirds of its length. 15. **Carum**
 21 Involucral leaves pennatifid 22. **Daucus**
 Involucral leaves not pennatifid 22
 22 Leaves simple, or pennate with simple leaflets. Leaves and stems hairy .
 16. **Pimpinella**
 Leaves pennate with divided leaflets. Leaves and stems glabrous
 13. **Trachyspermum**

*) *Foeniculum* and *Anethum* are very alike with exception of their fruit, which in *Anethum* are very distinctly winged, in *Foeniculum* not at all. When ripe fruit are not extant, *Foeniculum vulgare* and *Anethum graveolens* may be distinguished, besides by their characteristic odour, by slight differences of the stems and leaves: in *Foeniculum* the stems are finely punctulate, the sheaths are longer and broader than in *Anethum*, the main leaflets are usually shortly petioluled. In *Anethum* the stems are not punctulate, the sheaths are usually short in the lower leaves, the main leaflets are usually long-petioluled.

I. HYDROCOTYLE

LINN., Sp. pl., ed. 1, 1 (1753) p. 234; Gen. pl., ed. 5 (1754) p. 109;
 DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 116, 117 (1898);
 THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 951 (1925); *Hydrocotyle*
 sect. *Euhydrocotyle* BENTH., Fl. austr., 3, p. 337 (1866); BENTH. & HOOK.F.,
 Gen. pl., 1, p. 872 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 667
 (1879); BOERLAGE, Handl. Fl. Ned. Ind., I, 2, p. 613 (1890).

Key to the species.

- 1 Leaves peltate 3. **H. vulgaris**
 Leaves not peltate 2
 2 Leaves usually less than 3 cm in diameter. Stems creeping, sometimes with
 ascending extremities. Inflorescences single, sessile or short-peduncled along
 the creeping stems and the ascending tips. Fruit up to 15 in each inflor-
 escence, yellow to dark-brown when ripe . . . 2. **H. sibthorpioides**
 Leaves usually more than 3 cm in diameter. Stems creeping, with ascending
 branches. Inflorescences single or in bundles, sessile to long-peduncled, along
 the ascending branches only. Fruit more than 15 in each inflorescence,
 blackish-brown when ripe 1. **H. javanica**
 1. **Hydrocotyle javanica** THUNBERG — Herbaceous; stems creeping,
 with ascending flower-bearing branches, rarely entirely erect, 10—50 cm
 high, terete, glabrous or short-hairy. Leaves petiolate and stipulate;
 stipules 3—8 mm long, 4—6 mm broad, broadly ovate, rounded to acute,
 membranaceous, entire or sometimes fringed at the apex; petiole 2—
 20 cm long, shorter towards the extremities of the stems, short-hairy

with divaricate or more or less reflexed hairs; lamina 3—8 cm long and broad, smaller from the base to the tip of the stem, roundish to 5—8-angular in outline, cordate, 5—8-lobate, with more or less triangular lobes that are crenate to crenate-serrate, usually glabrous, rarely sparsely hairy on both sides. Inflorescences single or in groups opposite to the leaves, sometimes united to an umbel with an involucre of few small bracts, sometimes also terminal, but only originating from the ascending branches of the main stem; peduncle 1—7 cm long, rarely none, terete, glabrous or short-hairy; involucre with many bracts around and between the flowers that are nearly 1 mm long 0.75 mm broad, ovate, acute, sometimes with 2 small teeth at the base, often quite entire, the outer ones reflexed when fruit-bearing. Flowers sessile or upon pedicels up to 5 mm long, 15—50 in each inflorescence; calyx teeth none; petals nearly 1 mm long 0.5 mm broad, lanceolate, acute, valvate, styles nearly 0.5 mm long; mericarps 1—1.25 mm long, nearly 0.75 mm broad, red-brown to blackish when ripe, glabrous or short-hirsute, or even with short curved hairs, sometimes red-punctate when young, their lateral ribs not prominent.

Hydrocotyle javanica THUNBERG, Diss. Hydrocot. (1798) p. 3, no. 17, p. 6, t. 2; RICHARD, in Ann. Gén. Sc. Phys., 4, p. 65 (1820); D. C., Prodr., 4 (1830) p. 67; MORITZ, Syst. Verz. (1845—46) p. 41; MIQUEL, Fl. Ind. Bat., I, 1, p. 734 (1856); THWAITES, Enum. pl. Zeyl. (1859) p. 130; MIQUEL, Ill. Fl. Arch. Ind. (1871) p. 37; HIERN, in Fl. Trop. Afr., 3, p. 4 (1871); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 667 (1879) cum var. *podantha*; VIDAL, Phanerog. Cuming. Philipp. (1885) p. 19, 116; Rev. Pl. Vasc. Filip. (1886) p. 144; BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 613; STAFF, in Transact. Linn. Soc., ser. 2, bot., 4 (1894) p. 120, 167; TRIMEN, Handb. Fl. Ceyl., 2 (1894) p. 275; DRUDE, in Engl. & Pr., Nat. Pflanzenfam., III, 8, p. 119 (1898); KING, Mater. Fl. Mal. Pen., 13 (1902) p. 598; MATSUMURA & HAYATA, Enum. pl. Formos., p. 170 (1906); HAYATA, Fl. mont. Formos., p. 101 (1908); ELMER, Leaflet Phil. Bot., 2, p. 629 (1909); HAYATA, Ic. Pl. Formos., 2, p. 50 (1912); GIBBS, in Journ. Linn. Soc., bot., 42, p. 24, 85 (1914); RIDLEY, in Transact. Linn. Soc., ser. 2, bot., IX, 1, p. 62 (1916); BOLDINGH, Zakfl. Landbouwstr. Java (1916) p. 174; HEYNE, Nutt. pl. Ned. Ind., ed. 1, 3 (1917) p. 394; RIDLEY, in Journ. F. M. S. Mus., VIII, 4 (1917) p. 42; GIBBS, Contr. Arfak Mts. (1917) p. 165; MERRILL, Bibl. enum. Born. pl. (1921) p. 458; RIDLEY, Fl. Mal. Pen., 1 (1922) p. 869, ic. 73; MERRILL, En. Phil. Fl. Pl., 3 (1923) p. 237; RIDLEY, in Journ. Mal. Br. Roy. As. Soc., 1, p. 63 (1923); HEYNE, Nutt. pl. Ned.

Ind., ed. 2 (1927) 2, p. 1210; VAN STEENIS, in Trop. Nat., 17 (1928) p. 200; DAKKUS, in Bull. Jard. Bot. Buitenzorg, sér. 3, suppl. 1 (1930) p. 164; CRAIB, Fl. siam. enum., 1, p. 786 (1931); FREY-WYSSLING, in Trop. Nat., 22 (1933) p. 5; BURKILL, Diet. Econ. Prod. Mal. Penins., 1 (1935) p. 1212; *Hydrocotyle hirta* R. BROWN, ex RICHARD, in Ann. Gén. Sc. Phys., 4, p. 64 (1820); BENTHAM, Fl. austr., 3 (1866) p. 339; FILET, Plantk. Woordenb. (1876) p. 255; BAILEY, Queensl. Fl., 2 (1900) p. 715; WOLFF, in SCHUM. & LAUTERB., Nachtr. Fl. deutsch. Schutzgeb. (1905) p. 333; BAILEY, Compr. Cat. Queensl. Pl. (1913) p. 228; EWART, Fl. Victoria (1930) p. 895; LAUTERBACH, in Bot. Jahrb., 63, p. 473 (1930); *Hydrocotyle nepalensis* HOOK., Exotic Fl., 1, t. 30 (1823); D. C., Prodr., 4 (1830) p. 65; MOLKENBOER, in MIQUEL, Pl. Junghuhn., p. 91 (1851); MIQUEL, Fl. Ind. Bat., I, 1, p. 735 (1856); Ill. Fl. Arch. Ind. (1871) p. 38 cum forma *zeylanica*; FILET, Plantk. Woordenb. (1876) p. 109; BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 613; KOORDERS-SCHUMACHER, Syst. Verz., I, 1, fam. 228, p. 97 (1911); KOORDERS, Exkursionsfl. Java, 2 (1912) p. 722; *Hydrocotyle sundaica* BLUME, Bijdr., 15 (1826) p. 883; D. C., Prodr., 4 (1830) p. 67; HASSKARL, Cat. pl. Hort. Bot. Bogor. (1844) p. 163; MOLKENBOER, in MIQUEL, Pl. Junghuhn., p. 93 (1851); ZOLLINGER, Syst. Verz. Ind. Arch. 1842—1848 (1854) p. 138; MIQUEL, Fl. Ind. Bat., I, 1, p. 734 (1856); TEYSM. & BINNEND., Cat. pl. Hort. Bot. Bogor. (1866) p. 165; FILET, Plantk. Woordenb. (1876) p. 77; DAKKUS, in Bull. Jard. Bot. Buitenz., sér. 3, suppl. 1 (1930) p. 164; *Hydrocotyle globata* BLUME, Bijdr., 15 (1826) p. 883; D. C., Prodr., 4 (1830) p. 67; ZOLLINGER, Syst. Verz. Ind. Arch. 1842—1848 (1854) p. 138; MIQUEL, Fl. Ind. Bat., I, 1, p. 735 (1856); *Hydrocotyle zeylanica* D. C., Prodr., 4 (1830) p. 67; WIGHT & ARN., Prodr. Fl. Pen. Ind. Or. (1834) p. 366; MIQUEL, Fl. Ind. Bat., I, 1, p. 734 (1856); suppl. Sum. (1860) p. 134; *Hydrocotyle podantha* MOLKENB., in MIQUEL, Pl. Junghuhn., p. 89 (1851); MIQUEL, Fl. Ind. Bat., I, 1, p. 732 (1856); JUNGHUHN, Java, ed. HASSKARL, 1, p. 432 (1857); MIQUEL, Ill. Fl. Arch. Ind. (1871) p. 37; BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 613; DE CLERCQ, Plantk. Woordenb. (1909) p. 258; KOORDERS, Exkursionsfl. Java, 2 (1912) p. 721; *Hydrocotyle rotundifolia* (non D. C., 1830) WARBURG, in Bot. Jahrb., 13, p. 397 (1891); SCHUMANN & LAUTERB., Fl. deutsch. Schutzgeb. (1901) p. 487; KOORDERS, Versl. Dienstr. Minah. (1898) p. 488; *Hydrocotyle novo-guinensis* WARBURG, in Bot. Jahrb., 16, p. 24 (1892); SCHUMANN & LAUTERB., Fl. deutsch. Schutzgeb. (1901) p. 487; *Hydrocotyle Versteegii* HEMSLEY, in Kew Bull. (1909) p. 259.

Hydrocotyle javanica is spread over the whole area dealt with in

this paper, and is found from 30 to 3800 m elevation. It is, as a rule, well-distinguished from *H. sibthorpioides*, though for small forms of *H. javanica* it is often difficult to indicate exactly the differences with *H. sibthorpioides*. Those small forms, however, are nearly restricted to the higher parts of mountains, where large forms of *H. sibthorpioides* hardly occur, and if they do, are easily distinguished by their more roundish leaves and the arrangement of the inflorescences.

WARBURG distinguishes *H. novo-guineensis*, from New Guinea, based on the occurrence of curved hairs of the fruit, but agreeing, for the rest, with *H. javanica*. Of most materials from New Guinea, however, the fruit show such hairs, and now and then haired and glabrous fruit occur together on the same plant. Moreover, in the closely allied *H. sibthorpioides* specimens with hairy fruit occur as well as such with glabrous fruit, whereas it is impossible to trace a sharp limit between these two varieties.

H. Versteegii is mainly based on its peculiar leaf-shape. The same leaf-shape, however, we meet with in plants from Sumatra and Java, especially in forms of high mountains, and there we find all intermediary stages between such forms and the common ones.

The other species names listed here as synonyms, represent forms since long rightly united with *H. nepalensis* by former authors. Among them, *H. podantha*, or the var. *podantha*, with long-pedicelled flowers, is very striking in its extremes, but is connected with the more common form, with sessile or nearly sessile flowers, by a complete series of intermediates. The other varieties mentioned are less important.

MALAY PENINSULA. Kelantan, Kuala Sameh, NUR & FOXWORTHY s.n. (S); Kuala Pertang, NUR & FOXWORTHY 10283 (S); Gua Ninik, HENDERSON 19548 (B, S), v.n.: *pegaga gajah*; Perak, SCORTECHINI 1186 (BD); Temango, RIDLEY 14618 (S); Maxwell's Hill, 1100 m el., BURKILL & HANIFF 12912 (S); Gunong Pondok, north side, BURKILL 13902 (S); near the cottage, 1500—1800 m el., CURTIS 2086 (S), RIDLEY s.n. (S); Gunong Kerbau, Sungei Siput, HANIFF 4005, 4026 (S); upper Batang Padang valley, 600 m el., WRAY 1458 (S); Tapoh, CURTIS s.n. (S), v.n.: *pegaga gajah*; Goping district, 90—120 m el., KING's coll. 8197 (B); Pahang, Telom, RIDLEY 13541 (S); Lubok Tamang, 1050 m el., HENDERSON 11029 (S); Cameron's Highlands, Tanah Rata clearing, 1440 m el., HENDERSON 17931 (B, S); Fraser Hill, Tras valley, 1080 m el., HOLTTUM s.n. (S); south ridge, 1140 m el., NUR 11413 (S); base Gunong Senyum, low el., HENDERSON 22217 (S); Kuala Tahan, 105 m el., SEIMUND 37 (S); Selangor, Ulu Gombak, HUME 8813 (S).

SUMATRA. Atjèh, above Takingeun, 1260 m el., VAN STEENIS 5974 (B); Lant Toepandji, 1900 m el., VAN STEENIS 6541 (B); Gajo Locéus, Kota Lawe Sagoe, PRINGGO ATMODOJO (exp. VAN DAALEN) 396 (B, L); Kota Lintang, PRINGGO ATMODOJO (exp. VAN DAALEN) 215 (B, L); Tandjoeng Morawa, 30 m el., LÖRZING 4033 (B); Badjalinggi, s. of Tebingtinggi, 100 m el., LÖRZING 7463 (B); Sibolangit, 400 m el.,

DOCTERS VAN LEEUWEN 12714 (B); 450 m el., KARTA 15 (B, S); Botanic Garden, 400—500 m el., LÖRZING 3867 (B); Boekit Keloeang, NUR 7423 (B, S); Berastagi, BURKILL 73 (S); G. Sinaboeng, n. slope, 1450 m el., LÖRZING 8226 (B); Karo Plateau, n. of Berastagi, 1425 m el., LÖRZING 6786 (B, L); Siberaja, Lae Biang valley, 1150 m el., LÖRZING 9526 (B, L); Toba, Oeloean, 900 m el., OUWEHAND 142 (B); Batak regions, prob. southern part, JUNGHUHN s.n. (L), originals of *Hydrocotyle nepalensis*, forma *zeylanica* MIQUEL; Sumatra's Westkust, KORTHALS s.n. (L); Balang Paloepeoh, 900 m el., KLEINHOONTE 648 (B); Padang, Airmantjoer, 360 m el., BECCARI P.S. 623 (L); Bt. Nantigi, nr. G. Malintang, 1150 m el., BÜNNEMEIJER 3778 (B, BD, L, S, U), v.n.: *pigagoh*; G. Marapi, 1850 m el., BÜNNEMEIJER 4575 (B, L, U), v.n.: *mangi-mangi*; G. Talang, Laras Talang, 1500 m el., BÜNNEMEIJER 5162 (B, L), v.n.: *pingago*; G. Kerintji, 2400 m el., BÜNNEMEIJER 10411 (B); Sandaran Agong, 735 m el., ROBINSON & KLOSS s.n. (S); Pondok Boenga, 2800 m el., between Kajoe Aroe and the summit, 1400—3805 m el., FREY-WYSSLING 145 (B); 2900 m el., BÜNNEMEIJER 10001 (B, L, S); Batang Soengai Manau, 200 m el., POSTHUMUS 948 (B, S, U), v.n.: *lalat*; between Moearadoewa & Martapoera, DE VOOGD 35 (B); n. of Sepatoehoe, n. side of Danau Rana, 700 m el., VAN STEENIS 3860 (B); G. Raja, nr. Danau Rana, 1300 m el., VAN STEENIS 3574 (B); G. Raté Telanggaran, 400 m el., IBOET 27 (B, L), v.n.: *pegagan*; G. Tanggamoos, 1400 m el., DE VOOGD 171, 172 (B); estate Wai Rilau, 20 km east of Tandjoeng Karang, 50 m el., agronomist S. Sumatra s.n. (B).

BORNEO. Mt. Kinabalu, Dallas, 900 m el., CLEMENS 26382 (B); bed of Dahombang, 900 m el., HAVILAND 1273 (Sa); Panataran River basin, 1050—1200 m el., CLEMENS 32597 & s.n. (B); Colombon River basin, 2700—2850 m el., CLEMENS 33729 (B); Penibukan, Dahobang, 1200 m el., CLEMENS 30684 (B); Penibukan, 1200—1500 m el., CLEMENS s.n. (B); between Mensangau and Renagong, 600 m el., GIBBS 3038 (BM); Central Borneo, Boekit Tjihaan, AMDJAH (Exp. NIEUWENHUIS) 289 (B); Oeloe Bloëe, Mahakam Region, AMDJAH (Exp. NIEUWENHUIS) 278 (B); 20 km w. of Bontang, 100 m el., RUTTEN 468 (B, U); S.E. Borneo, KORTHALS s.n. (L); between Batoe Babi & Loemawia, HUBERT WINKLER 2869 (B, BD, L, S); West Koetai, Long Temelen, 200 m el., ENDERT 2890 (B); Long Petah, 450 m el., ENDERT 3256 (B); W. Koetai, Kong Kemoel, 1700 m el., ENDERT 4539 (B).

JAVA. Without exact locality: REINWARDT s.n. (L); ZIPPELIUS s.n. (L); ZOLLINGER 127 (BM); BLUME s.n. (L), v.n. *doelan sentak*; KORTHALS s.n. (L); JUNGHUHN s.n. (L), partly authentic of *Hydrocotyle podantha* MOLKENBOER; NAGEL 259 (BD); WAITZ s.n. (L); HASSKARL 131? (B); v.n. *doelan sentak*; „Doekoetan”, 1150 m el., MOUSSET 647 (B); Kapadoengan, VAN HASSELT s.n. (L); G. Karang, above Pandeglang, 500 m el., BACKER 7365 (B); Bodjongmanik, KOORDERS 40769 β (B); G. Paniis, s. of Djasinga, 450 m el., BACKER 10421 (B, L); Nirmala, 1500 m el., BACKER 10695 (B, L); Salak (?), BLUME s.n. (L), authentic of *Hydrocotyle sundaica* BLUME; Soekamantri, above Buitenzorg, 550 m el., BAKHUIZEN VAN DEN BRINK 3658 (B, L, U), v.n. *doelang sentak*; Salak, n. slope nr. Waroengloa, 650 m el., DANSER 6628 (G); Kotabatoe nr. Tjomas, BOERLAGE s.n. (L), v.n. *daoen sentak*, *doelang sentak*; 350 m el., DE MONCHY s.n. (B, L); Buitenzorg, 235 m el., HALLIER s.n., 129a (B, L), v.n. *doelang sentak*; 250 m el., VAN STEENIS 1524 (B); Goea si Gadjah, 250 m el., BACKER 31180 (B); Kalapa Noenggal, 300—500 m el., BACKER 23422, 5940 (B); Pasir Karet, above Gadok, 800 m el., BACKER 31919 (B); Poentjak, Eurad, 1200 m el., WISSE 1001 (B); Boerangrang, Wanajasa, s.e. of Poerwakarta, 1000 m el.,

BAKHUIZEN VAN DEN BRINK 4659 (B, L); Sindanglaja, PLOEM s.n. (L); Lemak Goenting, nr. Bandoeng, DOCTERS VAN LEEUWEN s.n. (B); Tjibeureum, nr. Bandoeng, 1550 m el., SMITH & RANT 40 (B); Boekit Toengoel, 1200—1650 m el., ZOLLINGER 2008 (BD), „*Hydrocotyle globata* BL., ZOLL., Cat. 139”; Palaboehanratoe, PLOEM s.n. (L); KOORDERS 33176 β (B), v.n. *dolong sontok*; Tjikidang nr. Paloeboehanratoe, 540 m el., BAKHUIZEN VAN DEN BRINK 271 (B, L); Tjiëmas, 500 m el., BACKER 25595 (B); Tjitjoeroeg, Tjitjibo, Tjidadap, Tjibeber, 800 m el., BAKHUIZEN VAN DEN BRINK, 2830 (B, L, U); Tjidadap nr. Tjibeber, 900—1000 m el., BACKER 22379 (B); Tjisokan valley, nr. Tjibeber, 750 m el., BAKHUIZEN VAN DEN BRINK 826 (B); G. Tjikoekoer, nr. Telaga Patengan, 1450 m el., LÖRZING 1431 (B); G. Patoeha, Tjiwidej, 1750 m el., COSTER 99 (B); s. slope, 2000 m el., LÖRZING 1341 (B); 2400 m el., BACKER 12767 (B); G. Malabar, WICHURA 2138 (BD); DOCTERS VAN LEEUWEN s.n. (B); Tjisoeroeli, 1320 m el., FORBES 936 (BD, BM, L), v.n.: *daoon sentok*, *doelang sentok*; 1400—2000 m el., DENKER 92 (B); 1500 m el., PULLE 3154 (U); Tjinjiroean, RANT s.n. (B); 1550 m el., RANT & SMITH 133 (B); Taloen, s. of Bandoeng, 1600 m el., REYNVAAN s.n. (B); 1700 m el., PULLE 3091 (U); 2100 m el., VAN DER PIJL 258 (B); G. Wajang, nr. Pengalengan, WARBURG 11243 (BD); G. Kentjana, s. slope, 1800 m el., VAN DER PIJL 401 (B); Kendeng G. Oeroeg, 2000 m el., SMITH & RANT 356 (B); G. Papandajan, s.w. slope, 1500 m el., BACKER 5491 (B); Tegal Pandjang, 2045 m el., VAN STEENIS 4340 (B); Garoet, BURCK s.n. (L); G. Goentoer, forest nr. Kawah Manoeck, 1550 m el., DANSER 6806 (B); G. Krattjak, BURCK 510 (B), v.n.: *djoelang sontok*; G. Poetri nr. Garoet, 900 m el., KOENS 116 (B); G. Djaja, 1460 m el., LAM 197 (B); G. Telagabodas, above Pangentjongan, 1200 m el., BACKER 31918 (B, L); Bivouac Denoe on the Tji Patoedja, 400 m el., BACKER 8927 (B, L); G. Tjeremai, BLUME l.c.; G. Slamet, above Batoe Raden, 700 m el., BACKER 433 (B); Petoengkriana, 1600 m el., BACKER 15892 (B); Josoredjo, 1400—1600 m el., BACKER 16111 (B); Diëng, JUNGHUHN s.n. (L), authentic of *Hydrocotyle podantha* MOLKENBOER; G. Oengaran, slope of Soerolaja, 700 m el., DE VISSER SMITS s.n. (B); Oengaran, 900—1200 m el., Medini, JUNGHUHN s.n. (L), v.n.: *goepogatel*; 1500 m el., n. slope, DOCTERS VAN LEEUWEN s.n. (B); G. Telamaja, KOORDERS 28052 β (B), v.n.: *poeser boemi*; Pringombo, KOORDERS 27126 β (B), v.n.: *semonggen*; Serajoe valley, Mangli, 700 m el., BRINKMAN 321 (B); G. Soembing, Potorono Mts., 800 m el., LÖRZING 106 (B, BD); Djiwa, n. of G. Merbaboe, 1500 m el., DOCTERS VAN LEEUWEN 1137 (B); G. Lawoe, above Djaragara, 600 m el., BACKER 6745 (B, L); G. Wilis, above Kediri, 1250 m el., BACKER 11362 (B); G. Andjasmoro, estate Pengandjaran, HOEDT s.n. (B); n. of Poedjon, 1300 m el., ARENS s.n. (B); G. Ardjoeno, Trètès, 800 m el., BREMEKAMP s.n. (B); G. Kawi, G. Keloed, Tapoh Walo, WARBURG 4228 (BD); G. Kawi above desa Printji, 2100 m el., ARENS s.n. (B); n.w. of Poenten, 1100 m el., VAN STEENIS 2500 (B); Bantaran, Proefstation Malang 1 (B); G. Tengger, northern slope nr. desa Ngepoeh, 1100 m el., VAN HARREVELD-LAKO 25 (B); Nangkadjadjar, 1200 m el., WISSE 546 (B); 1250 m el., JESWIET 569 (B); G. Tengger, 1200 m el., BUYSMAN 403 (U); w. slope, 1200 m el. & higher, MOUSSET 248 (B, BD); G. Seméroe, s.w. slope, 1000 m el., BACKER 3634 (B, L); between Smeroe-hoeve & Sendoera, 1300 m el., VAN STEENIS 7342 (B); Soerabaja, 800 m el., hot spring at Patjet, ALTMAN 64 (B); G. Argapoera, n.w. slope, 1200 m el., BACKER 13225 (B); Katjep, OTTOLANDER 343 (B), v.n.: *ramboan*; G. Idjen, Pantjoer, 1000 m el., OTTOLANDER 286 (B), v.n.: *mankok, telpok*; way to Idjen Highlands, 1300 m el., RANT s.n. (B); G. Kendeng above Kajoe-

mas, 1100 m el., BACKER 30732 (B); 1400 m el., BACKER 24909 (B); G. Idjen, w. slope, 1400 m el., BACKER 25375 (B); Gendingwaloeh, 1450 m el., KOORDERS 43159 β (B); Kendeng, forest Pantjoer-Idjen, KOORDERS 28557 β (B); 1400 m el., KOORDERS 21378 β (B); 1450 m el., KOORDERS 32668 β v.n.: *kocs-ti-kocsan* (B); G. Raoeng, s.w. slope, 2000 m el., VAN DER PIJL 128 (B); 1300 m el., CLASON 164 (G).

MADOERA. SAULIÈRE 135 (BD).

SELEBES. G. Klabat, 1300—1600 m el., KOORDERS 19036 β (B); Tondano, 690 m el., WISSE 40 (B); nr. Kajowatoe, KOORDERS 19032 β (B), v.n.: *kaki koeda rinteh doelang sontok*; Ratahan, KOORDERS 19035 (B), v.n.: *lalampang kawajoe, kaki koeda*; Bojong, WARBURG 15174 (BD); Lokon, SARASIN 466 (BD); Tjamba, TEYSMANN 12363 H.B. (B, L); Raoclo, 900 m el., BÜNNEMEIJER 12586 (B, L); Lombasang, 950 m el., BÜNNEMEIJER 10990 (B, L, U); G. Bantaeng, 1800 m el., BÜNNEMEIJER 12372 (B); Todjamboe, 800 m el., KJELLBERG 1697 (B).

SERAN. Mahoeala Ina, 200—300 m el., KORNASSI 731 (B, L, U).

JAPEN. 300 m el., STEIN 38 (BD).

NEW GUINEA. Arfak Mts., Angi Lakes, nr. Woman Lake, 2100 m el., GIBBS 5650 (BM); Nassau Mts., 1200 m el., DOCTERS VAN LEEUWEN 10790 (B); Cyclope Mts., MAYR 547 (B, BD); Alkmaar, VERSTEEG 1497 (B), original of *Hydrocotyle Versteegi* HEMSLEY; Kloof Bivouac, PULLE 157 (B); Oroh Valley, PULLE 1146 (B); Hellwig Mts., VON RÖMER 1189 (B); on the Noord-Rivier, VON RÖMER 375 (B); Utakwa Expedition, Camp Vic, 1650 m el., KLOSS s.n. (S); Kaiser Wilhelms Land, HELLWIG 633 (B); Hunsteinspitze, 1350 m el., LEDERMANN 10955 (BD); 1400 m el., LEDERMANN 11055a (BD); Schraderberg, 2070 m el., LEDERMANN 12064 (BD); Station Felsspitze, LEDERMANN 12391 (BD); Finisterre Mts., HELLWIG 357 (BD), cotype of *Hydrocotyle novoguineensis* WARBURG; 1200 m el., SCHLECHTER 18172 (BD); Sattelberg, WARBURG 20465 (BD); Junzaing, 800—1500 m el., MAYR 722 (BD); 800 m el., NYMAN 666 (BD); 850 m el., NYMAN 474 (BD); Saruwaged Mts., Ogerammang, 1800 m el., MAYR 810 (BD); Bismarck Mts., SCHLECHTER 14050 (B); Mt. Tafa, 2400 m el., BRASS 5005 (NY).

Distribution: from the Himalaya, China and Formosa in the North to the Solomon Islands in the East and Australia and Tasmania in the South; also in tropical Africa.

2. *Hydrocotyle sibthorpioides* LAMARCK — Herb; stems long-creeping or with ascendent extremities, sometimes almost caespitose, terete, thin or almost filiformous, glabrous or sparsely hairy, rarely densely hairy. Leaves petiolate and stipulate; stipulae 0.5—1 mm long, nearly 1.5 mm broad, ovate to obovate, acute, membranous, ciliate almost fringed or entire; petiole 0.5—6 cm long, or even shorter in the uppermost leaves, filiformous, more or less hairy with spreading or more or less reflexed hairs; lamina 0.3—2.5 cm long and broad, roundish to 5-angular in outline, deeply cordate, 3—5-lobed to 3—5-partite, the segments crenate to serrate, both surfaces more or less pilose to hirsute. Inflorescences along the creeping stems, single; peduncle 0—3 cm long, filiformous, glabrous or short-hairy; involucre with 4—10 bracts, nearly 1 mm long 0.5 mm broad, around and between the flowers, ovate-lan-

ceolate, acute, with 2 acute teeth at the base up to 0.5 mm long, sometimes filiformous, the lower ones reflexed when fruit-bearing. Flowers sessile or very shortly pedicelled, usually 10—15 in each inflorescence; calyx teeth none; petals nearly 0.75 mm long, 0.5 mm broad, ovate, acute, valvate; styles nearly 0.5 mm long. Mericarps 1—1.25 mm long, 0.75 mm broad, yellow to brown, never black, glabrous or with short stiff hairs, sometimes red-punctate; marginal ribs more or less prominent.

For the distinction of this species from *H. javanica* cfr. the latter.

Hydrocotyle sibthorpioides LAMARCK, Enc. méth., bot., 3 (1789) p. 153; PERSOON, Synops., 1 (1805) p. 302; RICHARD, in Ann. Gén. Sc. Phys., 4 (1820) p. 56, ic. 54, pl. 8; D. C., Prodr., 4 (1830) p. 66; MIQUEL, Ill. Fl. Arch. Ind. (1871) p. 39; BAKER, Fl. Maurit. & Seych. (1877) p. 132; CLARKE, in HOOKER FIL., Fl. Br. Ind., 2, p. 669 (1879); BOERLAGE, Handl. Fl. Ned.-Ind., I, 2 (1890) p. 613; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 119 (1898); HEYNE, Nutt. pl. Ned. Ind., ed. 1, 3 (1917) p. 394; MERRILL, En. Phil. Fl. Pl., 3, p. 237 (1923); BACKER & VAN SLOOTEN, Jav. Theeonkr. (1924) p. 184; OCHSE, Trop. groenten (1925) p. 190, cum ic.; JOCHEMS, in Trop. Nat., 15 (1926) p. 69; HEYNE, Nutt. pl. Ned. Ind., ed. 2 (1927) 2, p. 1210; VAN STEENIS, in Trop. Nat., 17 (1928) p. 200; SCHRÖTER & BACKER, in Festschr. Hans Schinz (1928) p. 579; VAN STEENIS, in Trop. Nat., 19 (1930) p. 84; DAKKUS, in Bull. Jard. Bot. Buitenz., sér. 3, suppl. 1 (1930) p. 164; ALSTON, in TRIMEN, Handb. Fl. Ceyl., 6 (1931) p. 137; CRAIB, Fl. siam. enum. 1, p. 787 (1931); OCHSE & BAKH., Ind. groenten (1931) p. 714, ic. 433; BACKER, Onkruidfl. Jav. Suikerrietgr., p. 473 (1931); BURKILL, Diet. Econ. Prod. Mal. Pen. (1935) 1, p. 1212; *Hydrocotyle nitidula* RICHARD, Ann. Gén. Sc. Phys., 4, p. 60, t. 63, fig. 33 (1820); J. W. HOOKER, Exot. Fl., 1 (1823) t. 29; D. C., Prodr., 4 (1830) p. 66; HASSKARL, Cat. pl. Hort. Bot. Bogor. (1844) p. 163; ZOLL. & MOR., in MORITZ, Syst. Verz. 1842—1844 (1845—46) p. 42; MOLKENB., in MIQUEL, Pl. Junghuhn., p. 92 (1851); ZOLLINGER, Syst. Verz. Ind. Arch. 1842—1848, p. 138 (1854); MIQUEL, Fl. Ind. Bat., I, 1, p. 735 (1856); THWAITES, Enum. pl. Zeyl. (1859) p. 130; MIQUEL, Fl. Ind. Bat., suppl. Sum. (1860) p. 134; HIERN, in Fl. Trop. Afr., 3, p. 5 (1871); FILET, Plantk. Woordenb. (1876) p. 19; DRUDE, in Engl. & Pr., Nat. Pflanzenfam., III, 8, p. 119 (1898); DE CLERCQ, Plantk. Woordenb. (1909) p. 258; *Hydrocotyle ranunculoides* var. *incisa* BLUME, Bijdr. Fl. Ned. Ind., 15 (1826) p. 884; HASSKARL, Cat. pl. Hort. Bot. Bogor. (1844) p. 163; *Hydrocotyle splendens* BLUME, Bijdr. Fl. Ned. Ind., 15 (1826) p. 884; D. C., Prodr., 4 (1830) p. 66; HASSKARL, Cat. pl. Hort. Bot.

Bogor. (1844) p. 163; Aanteek. Nut. (1845) p. 3, 59; MIQUEL, Fl. Ind. Bat., I, 1, p. 734 (1856); TEYSM. & BENNEND., Cat. Pl. Hort. Bot. Bogor. (1866) p. 165; FILET, Plantk. Woordenb. (1876) p. 19; DE CLERCQ, Plantk. Woordenb. (1909) p. 258; *Hydrocotyle hirsuta* var. *minuta* BLUME, Bijdr. Fl. Ned. Ind., 15 (1826) p. 884; RIDLEY, in Journ. Mal. Br. Roy. As. Soc., 1, p. 63 (1923); *Hydrocotyle rotundifolia* D. C., Prodr., 4 (1830) p. 64; ROXB., Fl. Ind., ed. 2, 2 (1832) p. 88; ed. 3 (1874) p. 270; CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 668 (1879); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 613; TRIMEN, Handb. Fl. Ceyl., 2 (1894) p. 275; DRUDE, in Engl. & Pr., Nat. Pflanzenfam., III, 8, p. 119 (1898); MATS. & HAYATA, Enum. pl. Formos. (1906) p. 171; HAYATA, Fl. mont. Formos. (1908) p. 102; DE CLERCQ, Plantk. Woordenb. (1909) p. 258; ELMER, Leaf. Phil. Bot., 2, p. 629 (1909); KOORDERS-SCHUM., Syst. Verz., 1, fam. 228, p. 97 (1911); KOORDERS, Exkursionsfl. Java, 2 (1912) p. 722; HAYATA, Ic. pl. Formos., 2 (1912) p. 50; VAN DONGEN, Overz. geneesmidd. Ned. Ind. (1913) p. 132; KOORD.-SCHUM., Syst. Verz., 3 (1914) p. 99; BOLDINGH, Zakfl. landbouwstr. Java (1916) p. 174; RIDLEY, in Journ. F. M. S. Mus., 8, IV (1917) p. 41; Fl. Mal. Pen., 1 (1922) p. 870; KOORDERS, Fl. Tjibodas, 2, p. 231 (1923); CHERMEZON, in LECOMTE, Fl. Indo-Ch., 2, p. 1137 (1923); *Hydrocotyle hirsuta* (non Sw., nec. SPRENG.) D. C., Prodr., 4 (1830) p. 67; MOLKENBOER in MIQUEL, Pl. Jungh., p. 92 (1851); ZOLLINGER, Syst. Verz. Ind. Arch. 1842—1848, p. 138 (1854); MIQUEL, Fl. Ind. Bat., I, 1, p. 732 (1856) cum var. *glabrata*; Ill. Fl. Arch. Ind. (1871) p. 37; FILET, Plantk. Woordenb. (1876) p. 336; BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 613; KOORDERS, in Nat. Tijdsch. Ned. Ind., 60 (1901) p. 370; DE CLERCQ, Plantk. Woordenb. (1909) p. 258; ERNST, Vegetationsbilder, 7. Reihe, 1—2 (1909) t. 9 & 10; VAN STEENIS, in Bull. Jard. Bot. Buitenzorg, sér. III, 13, p. 389 (1935); ZOLLINGER, Syst. Verz. Ind. Arch. 1842—1848, p. 138, 140 (1854); MIQUEL, Fl. Ind. Bat., I, 1, p. 733 (1856); FILET, Plantk. Woordenb. (1876) p. 268; DRUDE, in Engl. & Pr., Nat. Pflanzenfam., III, 8, p. 118 (1898); KOORDERS, Exkursionsfl. Java, 2 (1912) p. 721; *Hydrocotyle Zollingeri* MOLKENBOER, in MIQUEL, Pl. Junghuhn., p. 91 (1851); ZOLLINGER, Syst. Verz. Ind. Arch. 1842—1848 (1854) p. 138; MIQUEL, Fl. Ind. Bat., I, 1, p. 733 (1856); suppl. Sum. (1860) p. 134; TEYSMANN & BINNEND., Cat. Pl. Hort. Bot. Bogor. (1866) p. 165; FILET, Plantk. Woordenb. (1876) p. 147; *Hydrocotyle puncticulata* MIQUEL, Fl. Ind. Bat., I, 1, p. 732 (1856); *Hydrocotyle benguetensis* & *H. delicata* ELMER, Leaf. Phil. Bot., 2, p. 628, 629 (1909); MERRILL, Enum. Phil. Fl. Pl., 3 (1923) p. 237.

Hydrocotyle sibthorpioides is spread throughout the area dealt with in this paper and is found from 0 to 3680 m elevation. It is very variable as to the shape of the leaves, the depth of the incisions, and the hairiness of all parts. Many of the forms have been described as separate species, but as these forms are connected by all kinds of intermediates I agree with those authors who keep them all together under one specific name.

MALAY PENINSULA. Penang, Penara Bukit, 300 m el., CURTIS 1752 (S), v.n.: *pegaga*; Perak, Maxwell's Hill, 1110 m el., BURKILL & HANIFF 12915 (S); Johore, Mt. Austin, VESTERDAL s.n. (S); Singapore, Botanic Garden, TASSIM DAUD s.n. (S), v.n.: *kara-kara*; RIDLEY s.n. (S).

BATOE ISLANDS. Pulau Pini, shore, RAAP 624 (B).

SUMATRA. Sibolangit, 500 m el., LÖRZING 5271 (B, L, U); Karo Plateau nr. Berastagi, 1350 m el., LÖRZING 6071 (B); Piso-Piso, 1400—1500 m el., LÖRZING 9367 (B); Seriboe Dolok, 1420 m el., LÖRZING 9808 (B); Toba above the Air Bongbong valley, RUTTNER 258 (B); Karo Plateau nr. Raja, 1275 m el., LÖRZING 4826 (B); nr. Lingga, 1225 m el., LÖRZING 6245 (B); nr. Deleng Siosar, 1350 m el., LÖRZING 8564 (B); Habinsaran Plateau, 1200—1300 m el., LÖRZING 6557 (B); Pangoeroeran (Samosir), 910 m el., LÖRZING 7660 (B); Loeboek Raja, nr. Padang Sidempoean, DE VOGEL s.n. (B); Padang, KORTHALS s.n. (L); Danau-di-Atas, RUTTNER 259 (B); Siolak Daras, 900 m el., RIDLEY l.c.

BORNEO. Sarawak, Upper Rejang River, Kapit, CLEMENS 21268 (B); Kuching, CLEMENS 22309 (Sa); S. Borneo, Bandjarmasin, MOTLEY 238 (K).

JAVA. Without exact locality: JAGOR 684 (BD); HORSFIELD s.n. (U), authentic of *Hydrocotyle puncticulata* MIQUEL; HILLEBRAND s.n. (BD); BLUME s.n. (L), authentic of *Hydrocotyle splendens* BLUME; JUNGHUHN s.n. (L); ZOLLINGER 834 (L), original of *Hydrocotyle Zollingeri* MOLKENBOER; HASSKARL 131 (B), v.n.: *antanann lumboet*, *kakatoen djaran*; „Kapandongan”, VAN HASSELT s.n. (L); Pal Merah nr. Batavia, 20 m el., BACKER 32151 (B); Salemba nr. Batavia, 15 m el., BACKER 32150 (B); Buitenzorg, 240—250 m el., HEYNE s.n. (B); BOERLAGE s.n. & 108 (L), v.n.: *roempoet tikoes*; HALLIER 128a, 128b, 128d (B), v.n.: *antanann lemboet*; DANSER 5405 (G); VAN STEENIS 483 (B); Tjiomas, HALLIER 128c (B); above Pasir Pogor, BAKHUIZEN VAN DEN BRINK 5549 (B, L), v.n.: *antanann beurit*; Parakansalak, WARBURG s.n. (BD); Tjibodas, 1350—1425 m el., BURKILL 8252 (S); KOORDERS 31695 β , 32086 β (B), v.n.: *koerawet galeng*; SAPIIN 2064 (B); HALLIER 146, 240 (B); VAN STEENIS 2064 (B); Sindanglaja, PLOEM 118 (BD); G. Boerangrang nr. Wanajasa, 700 m el., BACKER 14227 (B); G. Tangkoebanprahoe, Lembang, 1200 m el., VAN STEENIS 1657 (B); 1900 m el., DOCTERS VAN LEEUWEN 11454 (B); Tjiareuj nr. Tjibadak, 600 m el., BAKHUIZEN VAN DEN BRINK 272 (B, L), v.n.: *antanann beurit*, *koerawet galeng*, *antanann lemboet*; Palaboehanratoe, KOORDERS 33163 β (B); between Soekaboemi & Njalindoeng, 600 m el., BACKER 14566 (B); Tjidadap nr. Tjibeber, 900 m el., BAKHUIZEN VAN DEN BRINK 7010 (B), v.n.: *antanann beurit*, *koerawet galeng*, *antanann lemboet*; ibidem 1000 m el., WINCKEL 1131 β (B), 1134 β (B, L), v.n.: *antanann beurit*; BAKHUIZEN VAN DEN BRINK 7011, 6700 (B), v.n.: *antanann beurit*; Leuwimanggoe, nr. Tjibeber, 780 m el., SIKAJA s.n. (B), v.n.: *antanann leutik*; G. Patoeha, Telaga Patengan, WARBURG 3119 (BD); 1600 m el., BACKER 12815 (B); Tjinjirean, 1600 m el., DOCTERS VAN LEEUWEN s.n. (B); G. Malabar, s. slope, 1585 m el., RANT s.n. (B), v.n.: *antanann*

beurit; Tjibeureum nr. Pengalengan, 1550 m el., SMITH & RANT 66 (B); G. Ipis, Tegal Primula, 2300 m el., DOCTERS VAN LEEUWEN 13337 (B); G. Papandajan, Tegal Kirinjoe, 2060 m el., VAN DER PIJL 542 (B); Tegal Aloen-aloen, upper course Tji Paroegpoeg, 2350—2500 m el., VAN STEENIS 4066 (B); Tjisangiri, WERKMAN s.n. (B), v.n.: *antanen beurit*; between Garoet & Waspada, 850 m el., BACKER 5296 (B); nr. kota Garoet, KOORDERS 37090 β (B); Garoet, BURCK s.n. (B); Doro, 500 m el., DOCTERS VAN LEEUWEN 463 (B); Petoengkriana, 1600 m el., BACKER 15917 (B); Josoredjo, 1500 m el., BACKER 16118 (B); G. Slamet, above Batoeraden, 700 m el., BACKER 432 (B); Poerwokerto, 75 m el., BACKER 74 (B); Diëng Plateau, 1800—2500 m el., VAN SLOOTEN 416, 339, 394 (B); JUNGHUHN s.n. (L), v.n.: *rendeng*; TEYSMANN s.n. (B), v.n.: *oetjie-oetjie*; DOCTERS VAN LEEUWEN 2256 (B); BACKER 21697 (B), v.n.: *andem*; WIRJOSAPOETRO 25 (L), v.n.: *djarem*; Wanasaba, 800 m el., BRINKMAN 322 (B); Moentilan, 350 m el., VAN RIJCKEVORSEL 87 (B); Kalitrotjok, above Tjandiroto, 800 m el., LÖRZING 295 (B, BD); Temangoeng, 550 m el., LÖRZING 248 (B, BD); G. Oengaran, above Padanglawas, Medini, 900—1200 m el., JUNGHUHN s.n. (L), v.n.: *soemoed kali, samangi goenong*, original of *Hydrocotyle Zollingeri* MOLKENBOER; G. Telamaja, KOORDERS 28051 β (B), v.n.: *katèpan*; Sepakoeng, 1000 m el., KOORDERS 42610 β (B), v.n.: *katèpan*; G. Merapi, above Sèlo, WARBURG 4226 (BD); Prigi, 5 m el., BACKER 11881 (B); above Malang, 1100 m el., HOFSTEE 29 (B); G. Seméroe, between Kaliglidik & Ampelgading, 700—800 m el., BACKER 3566 (B); G. Seméroe, 1200—1500 m el., ZOLLINGER 2315 (B, BD); G. Tengger, KJELLBERG s.n. (B); nr. Goeboegklakah, 600—1500 m el., ZOLLINGER 2542 (B, BD), v.n.: *samangi*, original of *H. latisecta* ZOLL.; above Lawang, MOUSSET 116 (B); Bodo Gendro, 900 m el., MÜLLER, Herb. Jav. 110 leg. MOUSSET (L); Tosari, 1800—2500 m el., BACKER 8395 (B); KOBUS s.n. (B); WARBURG 4229 (BD); way to Penandjaan, 2000 m el., DOCTERS VAN LEEUWEN 4583 (B); Ngadisari, 2000 m el., KOORDERS 37877 β (B); Moeroredjo, above 2000 m el., MOUSSET 332 (B); Ijang Plateau, Songi Kolboe, 2100 m el., KOORDERS 43460 β (B); 43581 β (B); 2200 m el., BACKER 9648 (B); Djember, 85 m el., ULTÉE 2 (B); Rawah Tapen Semboro, 28 m el., CLASON A69 (G); Bendo, OTTOLANDER 383 (B), v.n.: *pendjelongan* (jav.), *salatoen* (mad.); Idjen Plateau, nr. Djampit, 1500 m el., BACKER 25069 (B); above Oengoep, 1800—2400 m el., CLASON E20 (B, G); Kawah Idjen, 2000 m el., KOORDERS 43161 β (B, L); G. Merapi, 1900—2200 m el., BACKER 25338 (B); 2600 m el., KOORDERS 43160 β (B).

MADOERA. Pamekasan, VORDERMAN 119 (B), v.n.: *patèkan tjèna*.

KANGEAN ARCHIPELAGO. Sepandjang, 1 m el., BACKER 29186 (B).

SELEBES. Biroro nr. Lombasang, 850 m el., BÜNNEMEIJER 11639 (B); G. Bantaeng, 2500 m el., BÜNNEMEIJER 11910 (B, L); Rante Lemo, 1000—1200 m el., KJELLBERG 1424, 1432 (B); Todjamboe, 800 m el., KJELLBERG 1723 (B); B. Rante Mario, 2700 m el., KJELLBERG 3887 (B); Tawanga, B. Watoewila, 900 m el., KJELLBERG 1009 (B).

BOEROE. Fakal, 1050 m el., L. J. TOXOPEUS 450 (B, L).

SERAN. Kaniki, 600 m el., KORNASSI 1392 (B, L).

AMBON. ROBINSON 1793 (B).

NEW GUINEA. Arfak Mts., 1800 m el., GJELLERUP 1039 (B); Mt. Tafa, 2400 m el., BRASS 4898 (NY); Wharton Range, Murray Pass, 2840 m el., BRASS 4670 (NY). Mt. Albert Edward, 3680 m el., BRASS 4475 (NY).

Distribution: throughout tropical Asia, also in tropical Africa; South America (?).

3. *Hydrocotyle vulgaris* LINN. — Perennial herb; stem thin, creeping. Leaves petiolate, stipulate; petiole 1—9 cm long, with spreading hairs towards the limb; stipulae roundish, membranous; lamina orbicular, peltate, 0.7—3.5 cm in diameter, 8—13-nerved, coarsely crenate to slightly lobed. Inflorescences single or few together on the nodes; peduncle filiformous, 0.5—5 cm long, bearing 1—3 whorls of flowers in the apical portion, each flower with an ovate, membranous acute bract. Flowers sessile or shortly pedicelled; calyx teeth none; petals nearly 0.75 mm long, ovate, white or reddish. Fruit 1.75—2.5 mm broad, 1.5—2 mm long, transversely elliptical, densely beset with reddish small warts; stylopodium bipartite, the halves conical, bearing the styles on their apices. (Description after European and the under mentioned New Guinea plants.)

Hydrocotyle vulgaris Linn., Sp. pl., ed. 1 (1753) 1, p. 234; BENTHAM, Fl. austr., 3 (1866) p. 339; BAILEY, Queensl. Fl., 2 (1900) p. 715; SCHUMANN & LAUTERB., Fl. deutsch. Schutzgeb. (1901) p. 487; BAILEY, Compr. Catal. Queensl. Pl. (1913) p. 228; GIBBS, Contr. Arfak Mts. (1917) p. 165; HEGI, Ill. Fl. Mitteleur., V, 2, p. 952, ic. 2314a, 2316a, 2324—2328, tab. 190, fig. 5 (1925); EWART, Fl. Victoria (1930) p. 894.

NEW GUINEA. Arfak Mts., Angi Lakes, 2100 m el., GIBBS 5943 (BM, K), in open marsh, abundant in parts.

MARSHALL ISLANDS. SCHUMANN & LAUTERBACH, l. c.

Distribution: Europe, N. Africa, Australia, apparently not occurring on the Asiatic Continent.

II. CENTELLA.

Solandra LINN., Syst. nat., ed. 10 (1757) p. 1269; *Centella* LINN., Pl. afr. rar. (1760) p. 28; URBAN, in MART., Fl. bras., XI, 1, p. 286 (1879); DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 119 (1898); DOMIN, in Bot. Jahrb., 41, p. 148 (1908); WOLFF, in ENGL. & PR., Nat. Pflanzenfam., Nachtr. 3 (1908) p. 256; *Hydrocotyle* sect. *Centella* BENTHAM, Fl. austr., 3 (1866) p. 338; BENTH. & HOOK.F., Gen. pl., 1, p. 873 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 669 (1879); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 614.

Though the name *Solandra* is the oldest valid one for this genus, I accept the name *Centella*, as the latter has been proposed as a nomen conservandum, and probably will be accepted as such. Cfr. DOMIN, l. c., GREEN, in Kew Bull., 1935, p. 496.

Only species:

1. **Centella asiatica** (LINN.) URBAN — Perennial herb; stems creeping with long stolones, more or less puberulous in the young state. Leaves in rosettes; petiole 1—40 cm long, sometimes puberulous; lamina 1—7 cm in diameter, roundly-reniformous, crenate or crenate-dentate. Inflorescences umbellate, single or 2—5 together, in the axils of nearly 3 mm long bracts; peduncle 0.5—5 cm long, always shorter than the petioles; flowers usually 3, the middle one sessile, the lateral ones pedicellate; involucre 2-leaved, 3—4 mm long, nearly 1.5 mm broad, ovate. Calyx teeth none; petals 1—1.5 mm long, 0.75—1 mm broad, imbricate. Mericarps about 2 mm long, 1.5 mm broad, laterally compressed, often somewhat hairy in the young state, the ribs connected by transverse veins.

Hydrocotyle asiatica LINN., Sp. pl., ed. 1 (1753) 1, p. 234; BURMANN, Fl. ind. (1768) p. 74; HOUTTUYN, Nat. Hist., II, 8 (1777) p. 14; BLUME, Cat. (1823) p. 49; Bijdr. Fl. Ned. Ind., 15 (1826) p. 882, cum var. *subrepanda* & *lunata*; D. C., Prodr., 4 (1830) p. 62; WIGHT & ARN., Prodr. (1834) p. 366; HASSKARL, Cat. Pl. Hort. Bot. Bogor. (1844) p. 163, cum var. *glabriuscula* & *subrepanda*; Aant. Nut (1845) p. 3; ZOLLINGER, in Nat. & Geneesk. Arch. Ned. Ind., 2 (1845) p. 592; ZOLLINGER & MORITZI, in MOR., Syst. Verz. 1842—44 (1846) p. 42; MOLKENBOER, in MIQUEL, Pl. Junghuhn., p. 90 (1851); MIQUEL, Fl. Ind. Bat., I, 1, p. 731 (1856); suppl. Sumatra (1860) p. 134; BENTHAM, Fl. austr., 3 (1866) p. 346; TEYSM. & BINNEND., Cat. Pl. Hort. Bot. Bogor. (1866) p. 165; HIERN, in Fl. Trop. Afr., 3 (1871) p. 6; MIQUEL, Ill. Fl. Arch. Ind. (1871) p. 36; FILET, Plantk. Woordenb. (1876) p. 5; CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 669 (1879); BISSCHOP GREVELINK, Pl. Ned. Ind. (1883) p. 204; SCHUMANN, in Bot. Jahrb., 9, p. 213 (1888); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 614; WARBURG, in Bot. Jahrb., 13, p. 397 (1891); GRESHOFF, Nutt. Pl. Ned. Ind. (1894) p. 29, cum ic.; SMITH, in Teysmannia, 6, p. 152 (1895); KOORDERS, Versl. Dienstr. Minah. (1898) p. 487; BAILEY, Queensl. Fl., 2 (1900) p. 716; KING, Mat. Fl. Mal. Pen., 13 (1902) p. 599; MATS. & HAYATA, Enum. pl. Formos. (1906) p. 169; VALETON, in Bull. Dép. Agr. Ind. Néerl., 10 (1907) p. 43; DE CLERCQ, Plantk. Woordenb. (1909) p. 257; VAN DONGEN, Overz. Geneesm. Ned. Ind. (1913) p. 131; RIDLEY, Fl. Mal. Pen., 1 (1922) p. 869; in Journ. Mal. Br. Roy. As. Soc., 1, p. 63 (1923); EWART, Fl. Victoria (1930) p. 896; BURKILL, Diet. Econ. Prod. Mal. Penins., 1, p. 1210 (1935); *Trisanthus cochinchinensis* LOUREIRO, Fl. cochinch., 1 (1790) p. 176; *Centella asiatica* URBAN, in MART., Fl. bras., XI, 1, p. 287, t. 78, fig. 1 (1879); DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 119, ic. 47J

(1898); SCHUM. & LAUTERB., Fl. deutsch. Schutzgeb. (1901) p. 486; DOMIN, in Engl. Jahrb., 41, p. 158 (1908); KOORDERS-SCHUM., Syst. Verz., 1, fam. 228, p. 96 (1911); KOORDERS, Exkursionsfl. Java, 2 (1912) p. 723; KOORDERS-SCHUM., Syst. Verz., 3 (1914) p. 100; BOLDINGH, Zakfl. Landbouwwstr. Java (1916) p. 174; HEYNE, Nutt. Pl. Ned. Ind., ed. 1, 3 (1917) p. 395; GIBBS, Contr. Arfak Mts. (1917) p. 164; MERRILL, Interpr. Rumph. Herb. Amb. (1917) p. 411; DOCTERS VAN LEEUWEN, Hand. Eerste Ned. Ind. Natuurwet. Congres (1919) p. 60, 71; MERRILL, Bibl. Enum. Born. Pl. (1921) p. 458; DOCTERS VAN LEEUWEN, in Ann. Jard. Bot. Buitenz., 31, p. 130, 137 (1921); 32, p. 189 (1923); KOORDERS, Fl. Tjibod., 2, p. 231 (1923); MERRILL, Enum. Phil. Fl. Pl., 3 (1923) p. 238; CHERMEZON, in LECOMTE, Fl. Indo-Ch., 2, p. 1134, ic. 135, 1—3 (1923); NANNFELDT, in Svensk. Bot. Tidskr., 18, p. 422 (1924); BACKER & VAN SLOOTEN, Handb. Jav. Theonkr. (1924) p. 185; BAKER FIL., in Journ. Bot., 62, suppl., p. 44 (1924); OCHSE, Trop. groenten (1925) p. 185, cum ic. p. 187; JOCHEMS, in Trop. Nat., 15 (1926) p. 69, ic. 5; HEYNE, Nutt. pl. Ned. Ind., ed. 2, 2 (1927) p. 1210; KOOPER, in Rec. trav. bot. néerl., 24, p. 60 (1927); DOCTERS VAN LEEUWEN, Fourth Pacif. Sc. Congr., Krakatoa (1928) p. 76; SCHRÖTER & BACKER, in Festschr. Hans Schinz (1928) p. 561, 571; JOCHEMS, in Meded. Deli Proefstat. ser. II, 59, p. 64, 68 (1928); LAUTERBACH, in Bot. Jahrb. 63, p. 18 (1929); DOCTERS VAN LEEUWEN, in Bull. Jard. Bot. Buitenz., sér. III, 11, p. 35 (1930); DAKKUS, in Bull. Jard. Bot. Buitenz., sér. 3, suppl. 1 (1930) p. 64; VAN STEENIS, in Trop. Nat., 19 (1930) p. 85; CRAIB, Fl. siam. enum., 1, p. 786 (1931); BACKER, Onkr. Suikerrietgr., p. 474 (1931); OCHSE & BAKHUIZEN, Ind. groenten (1931) p. 701, ic. 426; DOCTERS VAN LEEUWEN, in Ann. Jard. Bot. Buitenz. 46—47 (1936) p. 404; *Hydrocotyle hebecarpa* D. C., Prodr., 4 (1830) p. 63; *Hydrocotyle asiatica* var. *hebecarpa* HASSK., Pl. jav. rar. (1848) p. 459; ZOLLINGER, Syst. Verz. Ind. Arch. 1842—1848 (1854) p. 138; *Hydrocotyle asiatica* var. *pedunculata* Kuntze, Rev. gen. pl., 1 (1891) p. 268.

This pantropic species is rather uniformous. It appears to occur all over Malaysia, and is found there from sea level to 2450 m altitude. After the depth of the basal incisions of the leaves and the more or less developed indumentum, BLUME distinguished the vars *subrepanda* and *lunata*. HASSKARL moreover distinguished (in Cat. Hort. Bog.) a var. *glabriuscula*. Also the species *Hydrocotyle hebecarpa* D. C. mainly based on the development of the indumentum of the peduncles and the fruit, was accepted later as a variety by HASSKARL. All these varieties, however, are so little prominent among the numerous slight variations of this species, that it appears useless to name them.

MALAY PENINSULA. Penang, Waterfall, CURTIS 1885 (S), v.n.: *pegaga*; Wellesley, Prai, NUR 6204 (B, S); Perak, Grik, BURKILL & HANIFF 12375, 13740 (S), v.n.: *pegaga*; Thaiping, WRAY 1765 (S); Tapah, BURKILL & HANIFF 13966 (S), v.n.: *dawn pegaga*; Telok Anson, Durian Sabatang, HANIFF 15622 (S), v.n.: *dawn pegaga*; Bagan Dato, HANIFF 16265 (S), v.n.: *pegaga*; Pahang, Bintang, BURKILL & HANIFF 16799 (S), v.n.: *pegaga*; Temerloh, HOLTTUM 24585 (S); Selangor, Ginting Simpah, 540 m el., HUME 9436 (S); Sungei Lalang Kajang, SYMINGTON 22691 (S), v.n.: *pegaga*; Malacca, Gunung Lalang, 1140 m el., RIDLEY s.n. (S); Johore, Sungei Tukong estate, GORDON SPARE 877 (S); Singapore, WICHURA 657 (BD); JAGOR 34 (BD); Sungei Jorong, RIDLEY 342 (S); Twali, RIDLEY 343 (S); Bukit Mandai, RIDLEY 3779 (S), v.n.: *pegaga*; Botanic Gardens, RIDLEY 13022 (S).

SUMATRA. Atjèh, Baleg, 1000 m el., VAN STEENIS 6092 (B); Médan, 50 m el., LÖRZING 3082 (B); Gedongdjohore, 50 m el., LÖRZING 3509 (B); Bèngkalis, Beloe kang, 5 m el., BEGUIN 313 (B, L), v.n.: *praga*; Sibolangit, Botanic Garden, 400—500 m el., LÖRZING 3859 (B); Seriboe Dolok, 1420 m el., LÖRZING 9775 (B); Karo Plateau near Lingga, 1225 m el., LÖRZING 6246 (B); nr. Raja, 1275 m el., LÖRZING 4976 (B); nr. Berastagi, 1350 m el., LÖRZING 6074 (B, L, U); estate Bah Biroeng Oeloc, nr. Pematang Siantar, BEUMÉE 6D (B); Habinsaran, 1100—1300 m el., LÖRZING 6528 (B); Moeara, 900 m el., OUWEHAND 52 (B); Hoeta Gindjang, RUTTNER 257 (B); Toba Plateau, Bahal Batoe nr. Siborongborong, 900 m el., HUITEMA 13 (B), v.n.: *ampa paga*; Dolok Mangoe, 1400 m el., POLAK 104 (B); Sumatra's Westkust, KORTHALS s.n. (L); Danau Biloeloe, nr. Soengai Nanam, Alahanpandjang, 1500 m el., JACOBSON 108 (B); Fort de Kock, JACOBSON 2057 (B), v.n.: *poegaga, tapah, pegaga*; Danau-di-Atas, RUTTNER 256 (B); Koemantan Koerintji, 850 m el., BÜNNEMEIJER 8115 (B); Boekit Tebakar, Kerintji, 900 m el., BÜNNEMEIJER 7932 (B, L, S), v.n.: *roempoeet pegambang*; estate Negara Batoe (Lampongs), DE VOGEL s.n. (B).

ANAMBAS & NATOENA ISLANDS. Siantan, e. of Tarempa, 50 m el., VAN STEENIS 763 (B).

BORNEO. Sandakan and vicinity, RAMOS 1848 (B); Rejang, BARTLETT s.n. (S, Sa), v.n.: *pegaga*; Upper Rejang River, Kapit, CLEMENS 21269 (B, Sa); Kuching, HAVILAND, 2045 (Sa); S.E. Borneo, between Kumam and Slinau, HUBERT WINKLER 2930 (BD); Bandjermasin, KORTHALS s.n. (L).

KRAKATAU (DOCTERS VAN LEEUWEN, l.c.); Verlaten Eiland, Casuarina-forest, DOCTERS VAN LEEUWEN 3731 (B).

JAVA. Without exact locality: REINWARDT s.n. (L); BLUME s.n. (B, L); HILLEBRAND s.n. (BD); Bantam, REINWARDT s.n. (L), v.n.: *pagagan*; G. Kantjana, KOORDERS 41187 β (B), v.n.: *antan*; between Mocntjang & Sadjira, 125 m el., BACKER 1924 (B), between Pengawoengan & Bajah, 5—50 m el., BACKER 1622 (B); Batavia, KUNIL & VAN HASSELT 1 (B); Pal Mérah, BACKER s.n.? (L); Weltevreden, 15 m el., BACKER 32083 (B); Kerendang, 5 m el., BACKER 32081 (B); Kebajoran, 30 m el., BACKER 32082 (B); Bidaratjina, 20—25 m el., EDELING s.n. (B); estate Tjikoempai, e. of Poerwakarta, 110 m el., HARMSSEN 96 (B); Wanajasa, 700 m el., BACKER 14223 (B); Nirmala, 1200 m el., BACKER 11143 (B); s. of Djasinga, 250 m el., BACKER 10488 (B); Kotabatoe nr. Buitenzorg, DE MONCHY s.n. (B); Buitenzorg, 250 m el., BLUME s.n. (B); BOERLAGE s.n. (L); DANSER 5511 (G); VAN HARREVELD s.n. (G), v.n.: *dawn kaki koeda*; BAKHUIZEN VAN DEN BRINK 422 (B); Tjomas, 250 m el., BAKHUIZEN VAN DEN BRINK 266 (B), v.n.: *antan*; dèsa Bondongan,

250 m el., HALLIER 127a, 127b (B), v.n.: *antanan*; Tjigombong, 500 m el., VAN STEENIS 58 (B); Tjiampèa, 150 m el., KOORDERS 30867 β (B), v.n.: *antanan*; Priangan, WARBURG 11244 (BD); G. Pangrunggo, VAN HASSELT s.n. (L); Tjipanas, BLUME or HASSKARL s.n. (B); Tjibodas, 1200 m el., KOORDERS 31844 β (B), v.n.: *antanan*; 1425 m el., HALLIER 237 (B, L), v.n.: *antanan*; Tjibadak, 380 m el., BACKER 859 (B); Tjidadap, s. of Tjibeber, 900 m el., BAKHUIZEN VAN DEN BRINK 27 (B), 1802 (B, L), v.n.: *antanan*; 1000 m el., WINCKEL 1147 β (B, L), v.n.: *antanan*; Leuwimanggoe, s. of Tjibeber, 1000 m el., SIKAJA s.n. (B); Tangkoebanprahoe, above Lèmbang, 1600 m el., BACKER 2456 (B); Bandoeng, Tjibeureum, DOCTERS VAN LEEUWEN s.n. (B); Tagogapoe, 650 m el., LÖRZING 1107 (B); G. Semboeng, nr. Bandoeng, 1300 m el., BACKER 12327 (B); G. Telagabodas, nr. Pangentjongan, 1000 m el., BACKER 32080 (B); Noesagedé, in the Pendjaloe Lake, 720 m el., KOORDERS 47889 β (B), v.n.: *antanan wangi*; estate Halimoen, 250 m el., ANONYMUS 12 (B), v.n.: *antanan*; Tjibareno, nr. Palaboehanratoe, 100 m el., WINCKEL 1866 β (B); Tjitjoeroeg, Djampang Koelon, 300 m el., BACKER 17211 (B); Njalindoeng, nr. Soekaboemi, 900—1000 m el., BACKER 14591 (B, L); Bodjong Lopang, 530 m el., BACKER 16996 (B); Takokak, 1000 m el., KOORDERS 15518 β (B), v.n. *antanan*; Telaga Patengan, 1600 m el., BACKER 12824 (B); estate Soekahati, 1250 m el., LEEFMANS s.n. (B), v.n.: *antanan*; G. Patoeha, Rantja Oepas, 1750 m el., BACKER 12739 (B); nr. Rantjawalini, 1725 m el., BACKER 12543 (B); Pengalengan, nr. lake, 1350 m el., FORBES 673 (B, BD); Tjilaki, WARBURG 3120 (BD); Rantjagedé, nr. Pengalengan, 1600 m el., BACKER 26109 (B); G. Malabar, nr. Tjinjiroean, 1600 m el., RANT s.n. (B), v.n.: *antan gedéh*; G. Goentoer, Kawah Kamodjan, 1300—1500 m el., KOENS 393 (B); G. Papandajan, BOERLAGE s.n. (L); SCHEFFER C15 (B), v.n.: *antan*; Tegal Aloen-aloen & Tegal Boenkroeng, 2450 m el., VAN STEENIS 4158 (B); G. Mandalagiri, VAN VUUREN s.n. (B), v.n.: *antan*; between Waspada and Tjisoeroepan, 1250 m el., BACKER 5471 (B); G. Tjikoerai, above Malèèr, 820 m el., BACKER 8667 (B); Tjisoeroepan, 1250 m el., BACKER 5590 (B); G. Tjerimai, between Linggardjati & Koeningan, 500 m el., BACKER 5042 (B); Tegal, Slawi, estate Doekoewringin, coll. estate manager no. 24 (B), v.n.: *oeles-oeles*; Pekalongan, Soebah, 200 m el., BEUMÉE 4300 (B), v.n.: *patjoel gowang, tapak djaran*; Petoengkriana, 1050 m el., BACKER 15932 (B); Madjenang, 30—100 m el., BACKER 18697 (B); Diëng, WARBURG 4225 (BD); 2000 m el., TEYSMANN s.n. (B), v.n.: *rindeng*; G. Prahoe Diëng, 2100 m el., VAN SLOOTEN 381 (B); G. Pangoran, 2000 m el., VAN SLOOTEN 379 (B), Diëng Plateau, 1900—2100 m el., BACKER 21621 (B); 1860 m el., JUNGHUHN s.n. (L), v.n.: *rendeng*; G. Panggonan Diëng, 2100 m el., BRINKMAN 278 (B); G. Soembing, 1800 m el., LÖRZING 835 (BD), v.n.: *rendeng*; G. Telamaja, KOORDERS 28039 β (B), v.n.: *rendeng*; nr. Sepakoeng, KOORDERS 29654 β (B), v.n.: *gagan-gagan, pane-gowang, patjoel gowang*; 1400 m el., KOORDERS 36320 β (B), v.n.: *gagan-gagan*; Salatiga, 570 m el., BACKER 30110 (B); DOCTERS VAN LEEUWEN s.n. (B); G. Merapi, above Bajalali, BEGUIN 73 (B); above Sèlo, WARBURG 4227 (BD); Kenanti, Ngarengan, KOORDERS 35653 β (B); G. Kidoel, E. of Djepitoe, 200 m el., BACKER 2800 (B); Pasanggrahan Ngebel, 700 m el., KOORDERS 23237 β (B), v.n.: *kerok batoh*; G. Willis, w. slope nr. Delapa, 150 m el., WISSE s.n. (B); G. Andjasmoro, w. slope, 900 m el., WINCKEL 127 β (B), v.n.: *samboeng otot banjoe*; Lawang, MOUSSET 88 (B); between Singosari & Lawang, 450 m el., KOOPER l.c.; Poenten, 1100 m el., HOFSTEE 3 (B); Nangkadjadjar, 1200 m el., WISSE 619 (B); G. Tengger, BUYSMAN

98 (U); Ranoe Rani, KOBUS 250 (B); Ranoe Kembolo, 2450 m el., WURTH s.n. (B); Ngadisari, CLASON A70 (G); G. Seméroe, between Kali Glidik & Ampel Gading, 700 m el., BACKER 3786 (B); Djatiroto, 20 m el., BACKER 8117 (B, L); between Poeger & Amboelo, 10—20 m el., BACKER 18200 (B); Poeger, KOORDERS 21379 β (B), v.n.: *gagan-gagan*; Djember, 85 m el., ULTÉE 1 (B); Idjen, 1500 m el., ZOLLINGER 632 (BD, L); Pantjoer, OTTOLANDER 315 (B), v.n.: *gangagan, koeste-koesan*.

BALI. ZOLLINGER l. c.

TIMOR. D. C., l. c.; ex Mus. Paris, coll. ? (BD, L); ZIPPELIUS s.n. (L).

SELEBES. Kota Manado, 0 m el., KOORDERS 19033 β (B), v.n.: *daon kaki koeda, panigowang*; Kajoewatoe, 200 m el., KOORDERS 19034 β (B), v.n.: *kaki koeda, tispo*; Manado, KOORDERS 19037 β (B), v.n.: *kaki koeda*; Tondano, WARBURG 15173 (BD); Maros, WARBURG 16132 (BD); Piek van Maros, Bikeroe Lawa, WARBURG 16133 (BD); T. Manipi, WARBURG 16134 (B); Sangona, 100 m el., KJELLBERG 1153 (B); Aboeki Asinorea, 200 m el., KJELLBERG 916 (B); Rante Lemo, 1100 m el., KJELLBERG 1425 (B).

TERNATE. Lagoena, 350 m el., BEGUIN 625 (B), v.n.: *kolotide manora*.

BATJAN. WARBURG 18115 (BD), v.n.: *daun kaki kuda*.

AMBON. Karang Pandjang, RANT 270 (B); C. B. ROBINSON, Pl. Rumph. Amb. 326 (B).

AROE ISLANDS. Dobo, JENSEN 229 (B, L).

NEW GUINEA. Without exact locality: NYMAN 204 (BD); Rouffaer River, 125 m el., DOCTERS VAN LEEUWEN 9744 (B); Hollandia, GJELLERUP 76 (B); Merauke, KOCH s.n. (B, L), v.n.: *dogouke, gogouke, andanan*; nr. Kampong Kabatiel, BRANDERHORST 251 (B); Bismarck Plain, LAUTERBACH 2838 (BD); Constantinhafen, LAUTERBACH 1275 (BD); Finschhafen, WARBURG 20464 (BD); Bumi River, WEINLAND 372 (B, BD); Astrolabe Plain, LAUTERBACH l. c.

Distribution: tropical and subtropical regions of the whole world.

III. TRACHYMENE

RUDGE, in Transact. Linn. Soc. London, ser. I, 10, p. 300 (1811); BENTHAM, Fl. austr., 3 (1866) p. 347; BENTHAM & HOOKER FIL., Gen. pl., 1, p. 873 (1867); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 614; *Didiscus* D. C., in Curt. Bot. Mag., 55, t. 2875 (1828); Mém. Ombell. (1829) p. 28, t. 4; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 120 (1898); DOMIN, in Sitzungsber. Böhm. Gesellsch. Wissensch. (1908) p. 2.

Though the mode of growth of the *Trachymene* species described in the following is indicated in the descriptions separately, it might be useful to spend a few words on it here.

Trachymene caerulea, introduced from Australia as a garden plant, is entirely different from the other species, which all are indigenous plants from mountain summits. *Tr. caerulea* is an annual herb, with a well-developed primary root with fibrous branches, without well-

developed rosettes, and with one erect stem branched in the upper portion only, the umbels forming a terminal corymb.

Of the other species, *Tr. saniculaefolia*, *Tr. novoguineensis*, *Tr. koebrensis*, *Tr. rigida*, *Tr. acrotricha*, and *Tr. erodioides* mainly agree in mode of growth. They are certainly perennials. *Tr. saniculaefolia* may be regarded as the type of this group, as more abundant and more polymorphic materials of it are available. It has a branched caudex, bearing rosettes at the extremities. From these rosettes may develop in the first place lateral rosettes, taking their origin from the axils of the upper leaves; after the dying off of the parent rosette, its persistent axis continues the caudex. In the second place the rosettes may give rise to either a single terminal umbel, or to a terminal stem bearing a number of leaves and a terminal umbel. These leafy stems usually are not erect but more or less spread, and may develop rosettes in the axils of the leaves, one or two of these forming again terminal umbels, or again leafy stems, in the latter case continuing the stem in a sympodic way.

Tr. novoguineensis is like *Tr. saniculaefolia*, but prolonged leafy stems bearing axillary rosettes are unknown hitherto.

Tr. rigida and *Tr. koebrensis* mainly agree with *Tr. saniculaefolia*. In *Tr. acrotricha* real rosettes are unknown; all stems are prolonged and leafy and the caudex probably is continued by the persistent bases of the leafy stems. Of *Tr. erodioides* the lower portions of the stems are unknown, but the sympodic stems bearing few-leaved axillary rosettes justify the supposition that its mode of growth chiefly agrees with that of *Tr. saniculaefolia*.

A second group of species is formed by *Tr. celebica* and *Tr. Sarasinorum*, not much differing, however, in mode of growth from the preceding. The structure of the caudex and of the basal rosettes is the same, but the leafy stems, developing from the rosettes, never bear axillary rosettes and always a terminal corymbiform dichasium of umbels.

A third group is formed by *Tr. acerifolia*, *Tr. arfakensis*, *Tr. papillosa* and *Tr. adenodes*. The subterranean parts of these plants are not adequately known in any of these species, hence it is unknown, whether the plants are annual or perennial. The general habit of the stems suggests that they may be perennial, but the few roots present in the specimens of *Tr. acerifolia* and *Tr. arfakensis* appear not to be torn off from a caudex, and to be annual. The stems are more or less erect, and branched only towards the extremities, forming a leafy di-mono-chasium of umbels. Basal rosettes are either entirely lacking, as in

Tr. acerifolia, *Tr. papillosa* and *Tr. adenodes*, or are weekly developed, as is the case in *Tr. arfakensis*.

Tr. rosulans is entirely different from all other species described in this paper. From the roots present in the herbarium specimens, it is not evident whether the plant is annual or perennial. As the root system is weekly developed, one might consider the plant to be annual, but the main stem developing stolones, it may be possible that the plant is perennial.

The genus is chiefly Australian, but outside Australia it is spread to New Caledonia, the Fiji Islands, the Philippines, and, in the area considered in this paper, in New Guinea, Borneo, Selébes, Timor and Flores.

As to the question whether this genus has to be named *Trachymene* or *Didiscus*, I follow NORMAN in Journ. of Bot., 69, p. 287. See also DOMIN, l. c.

Key to the species.

- 1 Plant glandular-hairy 2
- Plant not glandular-hairy 3
- 2 Ovary hairy. Ripe fruit roughly tuberculate with glandular hairs. Annual, erect, cultivated 14. *T. caerulea*
- Ovary glabrous. Ripe fruit smooth. Wild mountain species 11. *T. adenodes*
- 3 Leaves nearly triangular and somewhat hastate in outline, tripartite or ternate with the middle segment longer than the lateral ones 6. *T. erodioides*
- Leaves never triangular-hastate, more roundish or cuneate in outline, if tripartite or ternate, than the middle segment hardly longer than the lateral ones 4
- 4 Leaves more long than broad, all of them cuneate to spatulate . . . 5
- Leaves more broad than long, sometimes the upper ones cuneate, rarely also the lower ones broadly cuneate 8
- 5 Leaves coriaceous and stiff, the lamina at least 5 times as long as broad 4. *T. rigida*
- Leaves not coriaceous and stiff, the lamina at most 3 times as long as broad 6
- 6 Petiole at least twice as long as the lamina. Prolongated leafy stems absent 2. *T. novoguineënsis*
- Petiole as long as the lamina or shorter. Leafy stems present . . . 7
- 7 Peduncles longer than the leaves. Leaves cuneate, in rosettes at the bases of the stem and the branches 3. *T. koebreensis*
- Peduncles shorter than the leaves. Leaves subspathulate, not in rosettes, but somewhat crowded towards the extremities of the stems 13. *T. rosulans*
- 8 Stems procumbent. Leaves to 1 cm long and broad, their teeth with apical hairs 5. *T. acrotricha*
- Stems erect or adscendent, sometimes caespitose. Leaves more than 1 cm long and broad, their teeth not with apical hairs 9

- 9 Plants with rosettes at the bases of the stems, sometimes also in the upper leaf axils and at the bases of the branches 10
- No rosettes at the base of the stems and the branches, or if small rosettes are present at the base of the stems, these rosettes have disappeared before flowering and the umbels do not form a 'terminal corymb' 12
- 10 Umbels single from the rosettes, or moreover from the prostrate stems, but never forming a corymbiformous dichasium 1. *T. saniculaefolia*
- Umbels forming a corymbiform dichasium on more or less erect stems 11
- 11 Calyx teeth at most 0.75 mm long. Leaves more or less divided, but not ternate 7. *T. celebica*
- Calyx teeth up to 2.5 mm long. Leaves ternate 8. *T. Sarasinorum*
- 12 Leaves to 2 cm long and broad. Surface of stems, sheaths, and petioles densely papillose. Fruit with knob-shaped trichomes 12. *T. papillosa*
- Leaves more than 2 cm long and broad. Stems, sheaths and petioles not papillose. Fruit smooth 13
- 13 Leaves not in rosettes, but more densely placed in the lower thicker portion of the stem, 3-fid to ternate, biserrate with acute teeth 9. *T. acerifolia*
- Probably small rosettes at the very base of the stem, the latter very slender in its lower portion. Leaves ternate with petiolulate leaflets, the latter serrate with broad, shortly acuminate teeth 10. *T. arfakensis*

1. *Trachymene saniculaefolia* STAPF — Perennial herb, with a caudex from which originate rosettes, and, from these rosettes, inflorescences or sympodic leafy stems, bearing terminal inflorescences and axillary rosettes, the latter flower-bearing or not. Leafy stems, if present, up to 2 mm thick, terete, striate, more or less hirsute with hairs up to 1 mm long, or glabrous. Leaves with sheaths 5—10 mm long, 2—3 mm broad, densely hirsute with hairs up to 2 mm long to glabrous and always ciliate, tapering into the petiole; petiole 3—13 cm long, densely hirsute to glabrous; lamina hirsute on both surfaces to glabrous, very variable as to form and size, roundly-reniformous to broadly cuneate in outline, always broader than long, 0.7—4 cm long, 1—6 cm broad, trifid to tripartite or even ternate, with segments broadly rhomboid or narrower, sometimes divided again, the ultimate segments serrate to lobate in the apical portion. Umbels terminal in the rosettes or on elongated stems opposite to the leaves; peduncle 3—29 cm long, terete, striate, hirsute to glabrous; involucre bracts 7—25 in number, 5—15 mm long, 1—3 mm broad, lanceolate, acuminate, sometimes dentate, glabrous or hirsute, spreading during flowering, appressed later; pedicels 5 to more than 30 in each umbel, the outer ones 5—15 mm long, the inner ones gradually shorter, spreading when flower-bearing, usually incurved when fruit-bearing. Calyx teeth triangular, acute, 0.5—2 mm long, 1—1.5 mm broad at the base, equally developed or one of them larger; petals ovate to lanceolate, 2—2.5 mm long, 0.5—1.5 mm broad; styles 0.5—1.5 mm long. Mericarps

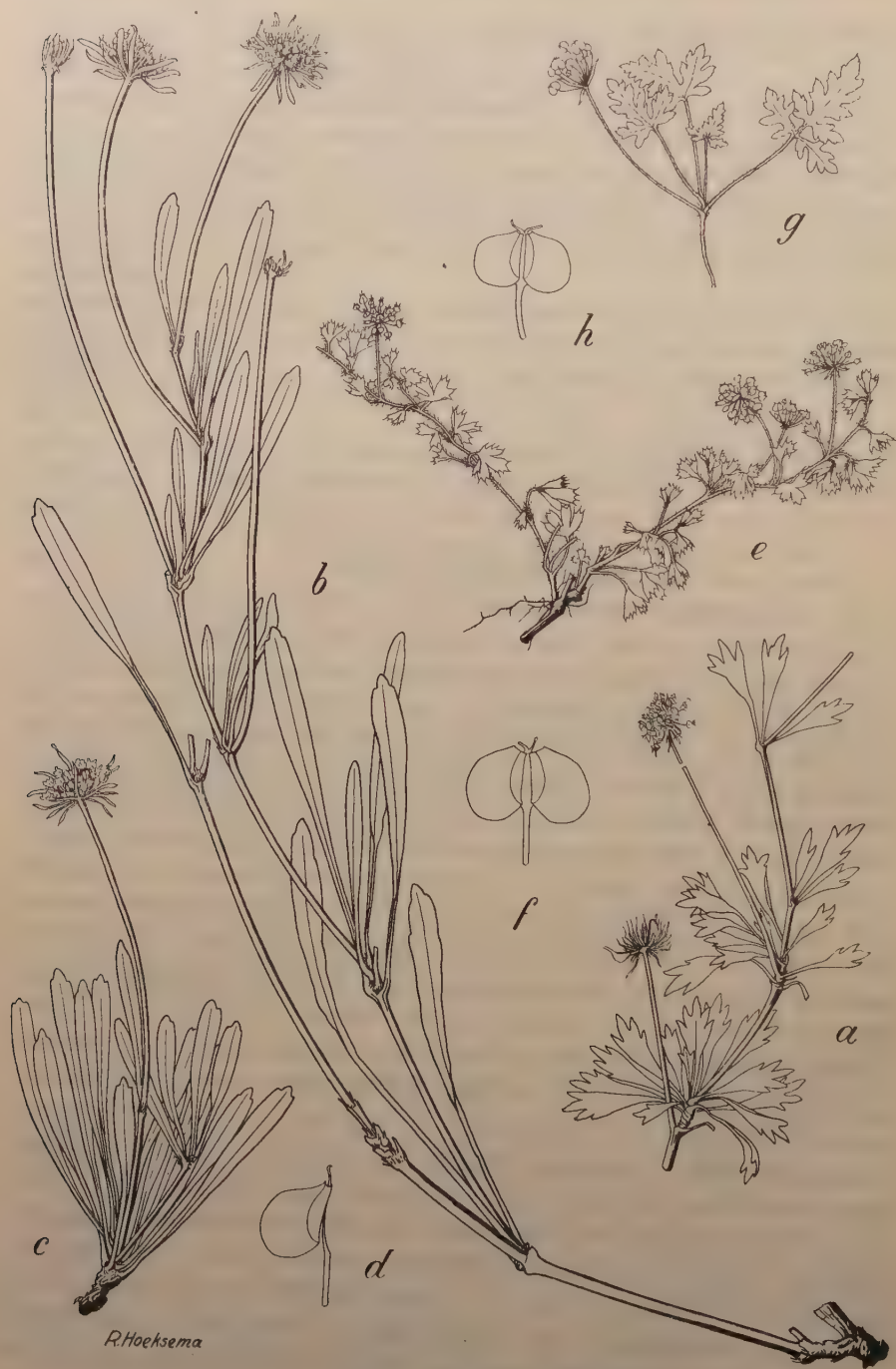


Fig. 1 — *Trachymene* (cf. p. 143, bottom).

1.5—3 mm long, 1—2 mm broad, glabrous, those of the same fruit equally developed; distance between the jugae intermediae and the jugae commissurales 0.5—1 mm; carpophore entire, 4-apiculate, though deeply grooved and sometimes translucent in the middle, only bipartite after weathering.

Trachymene saniculaefolia STAPF, in HOOKER, Ic. pl., 24, t. 2308 (1894); in Transact. Linn. Soc., ser. 2, bot., 4, p. 124, 167 (1894); *Didiscus saniculaefolius* MERRILL, in Phil. Journ. Sc., bot., 2, p. 255, 256, 292 (1907); DOMIN, in Sitzungsber. Böhm. Gesellsch. Wissensch., 1908, p. 65 (1908) quoad var.s *typicum*, *rupicolum*, *brachystylum*; MERRILL, in Ann. Jard. Bot. Buitenzorg, suppl. 3, part 1, p. 283, 287, 288, 293, 302 (1910); HALLIER, in ELBERT, Sunda-Exp., 2, p. 294 (1912); GIBBS, in Journ. Linn. Soc., bot., 42, p. 39, 43, 47, 85 (1914) cum var.s *typico* et *rupicola*; WOLFF, in ENGL. & PR., Nat. Pflanzenfam., Nachtr. 4 (1915) p. 222; GIBBS, Contr. Arfak Mts. (1917) p. 166; MERRILL, Bibl. Enum. Born. Pl. (1921) p. 458; Enum. Phil. Fl. Pl., 3, p. 238 (1923); VAN STEENIS, in Bull. Jard. Bot. Buitenzorg, sér. III, 13, p. 255 (1934) excl. synon.; an DIELS, in Bot. Jahrb., 62, p. 486 (1929)?

Trachymene saniculaefolia is rather variable as to the dimensions of the different parts, the length of the stems, the hairiness, and the shape and incisions of the lamina. DOMIN describes 4 varieties, viz. the var.s *typicus*, and *rupicolus* from Borneo, and the var.s *novoguineensis* and *brachystylus* from New Guinea. The var. *novoguineensis* shows such sharp and constant differences with the typical form, that it appears better to distinguish it as a separate species. The var. *rupicolus*, of which I saw originals in the Kew Herbarium, only differs from the typical form by the smaller dimensions and the dense mode of growth and appears to be a form of high mountain summits. The var. *brachystylus*, of which I likewise saw originals in the Kew Herbarium, entirely agrees with the plants collected by BRASS in New Guinea, and is only little different from the var. *typicus* by smaller dimensions. According to DOMIN, it is an intermediate between his var. *typicus* and his var. *novoguineensis*, and it has the short styles of the latter. As to the leaf-shape this is not correct, and the length of the styles is rather variable as well in *Tr. novoguineensis* as in *Tr. saniculaefolia*, and appears to have no value for the distinction of these two.

Fig. 1. — a: *Trachymene koebrensis*, after GIBBS 5606, $\frac{2}{3} \times$; b—d: *Trachymene rigida*, after LAM 1645; b—c: flower-bearing stems, $\frac{2}{3} \times$; d: mericarp, $4 \times$; e—f: *Trachymene acrotricha*, after KJELLBERG 3884; e: plant, $\frac{2}{3} \times$; f: mericarp, $4 \times$; g—h: *Trachymene erodioides*, after KJELLBERG 3885; g: fruit-bearing stem fragment, $\frac{2}{3} \times$; h: mericarp, $4 \times$.

It is very remarkable that *Tr. suniculaefolia* proves to occur in Australia. The Australian plants agree very well with those collected on Mt. Kinabalu in Borneo.

PHILIPPINE ISLANDS. Mindoro, Mt. Halcon, MERRILL 6174 (BD, K, L).

BORNEO. Mt. Kinabalu, CLEMENS 30058 (B); 2175 m el., WHITEHEAD s.n. (BM); Temberungo, 2310 m el., HAVILAND 1162 (BM, K, S, Sa), petals white; Kemberanga, CLEMENS 10522, 10538 (B); 2400 m el., open shallow sand, GIBBS 4150 (BM, K); 2100—3300 m el., Marai Parai, above Kamburangan, under great wall, CLEMENS 33164 (B, BM), petals white, organs pinkish, fruit purplish, same colour as stem; 2400 m el., WHITEHEAD s.n. (BM); 2400—3000 m el., Ramburangat to Paka Batra, damp places, GIBBS 4221 (BM, K); 2700 m el., Colombon River basin, on base of wall at falls, CLEMENS 33735 (B, BM); 2100—3300 m el., LOWE s.n. (K); 3000 m el., BURBIDGE s.n. (K); NATIVE COLLECTOR 44 (E, Sa), flower white; 3300—3900 m el., WHITEHEAD s.n. (BM); 3600—3900 m el., granite cap, cracks in granite, GIBBS 4184 (BM); 3900 m el., summit, cracks in granite, GIBBS 4310 (BM); 3900 m el., in crevices of rock right to the top, HAVILAND 1130 (K, S, Sa); 3900 m el., granite cave, HOLITUM s.n. (S); Paka Cave, CLEMENS 10563 (K); Paka Cave to Low's Peak, CLEMENS 10612 (B, K); Low's Peak, 4020 m el., granite crevices, CLEMENS 27098 (B), fruit reddish purple, Dusan medicine.

NEW GUINEA. S.E. part, Central Division, Wharton Range, Murray Pass, 2840 m el., BRASS 4671 (NY), common amongst grass near forest borders, sometimes as a weed on burnt over ground, indumentum red, petioles, peduncles and fruit red, flowers pink; Mt. Albert Edward, 3680 m el., BRASS 4244 (NY), common, forest glades, whole plant reddish, flowers dark pink; Mt. Scratchley, 3000—3900 m el., GIULIANETTI s.n. (K), originals of *Didiscus saniculifolius* var. *brachystylus* DOMIN.

AUSTRALIA. N.S. Wales, Jenolan Caves, BLAKELY s.n. (BM).

2. *Trachymene novoguineënsis* (DOMIN) BUWALDA, n. sp. — Fig. 2a.

— Herba perennis, e caudice rosulas proferens vel e caulibus repentibus nonnihil prolongatis iterum rosulas formans. Foliorum vagina ad 2.5 mm longa et 3 mm lata, in petiolum attenuata, margine ciliata pilis ad 2 mm longis; petiolus longitudine variabili, 1—13 cm longus, lamina semper longior, glabra vel laminam versus pilis ad 2 mm longis hirsutus; lamina cuneata, 0.7—3 cm longa, 0.5—1.7 cm lata, triloba vel trifida, segmentis apice dentibus 2 vel 3 latis, nonnihil acuminatis, utrinque glabra vel pilis ad 2 mm longis adpresse hirsuta. Umbellae singulae e rosulis; pedunculus 3.5—37 cm longus, teres, striatus vel subsulcatus, glaber vel pilis ad 1.5 mm longis hirsutus; bracteae involuerantes 7—13, lanceolatae, acutae, 8—12 mm longae, 0.5—1.25 mm latae, glabrae vel margine ciliis nonnullis ad 1 mm longis, tempore florendi patentibus, postea adpressae; pedicelli 12—30, florum exteriorum ad 5 mm longi, divergentes, florum interiorum gradatim breviores, post anthesin paulum aucti ad 14 mm longi, incurvati, omnino glabri. Calycis dentes anguste vel late triangulares,

Fig. 2. — a: *Trachymene novoguineënsis*, after PULLE 975, $\frac{2}{3} \times$; b: *Trachymene arfakensis*, after GJELLERUP 1128, $\frac{2}{3} \times$.

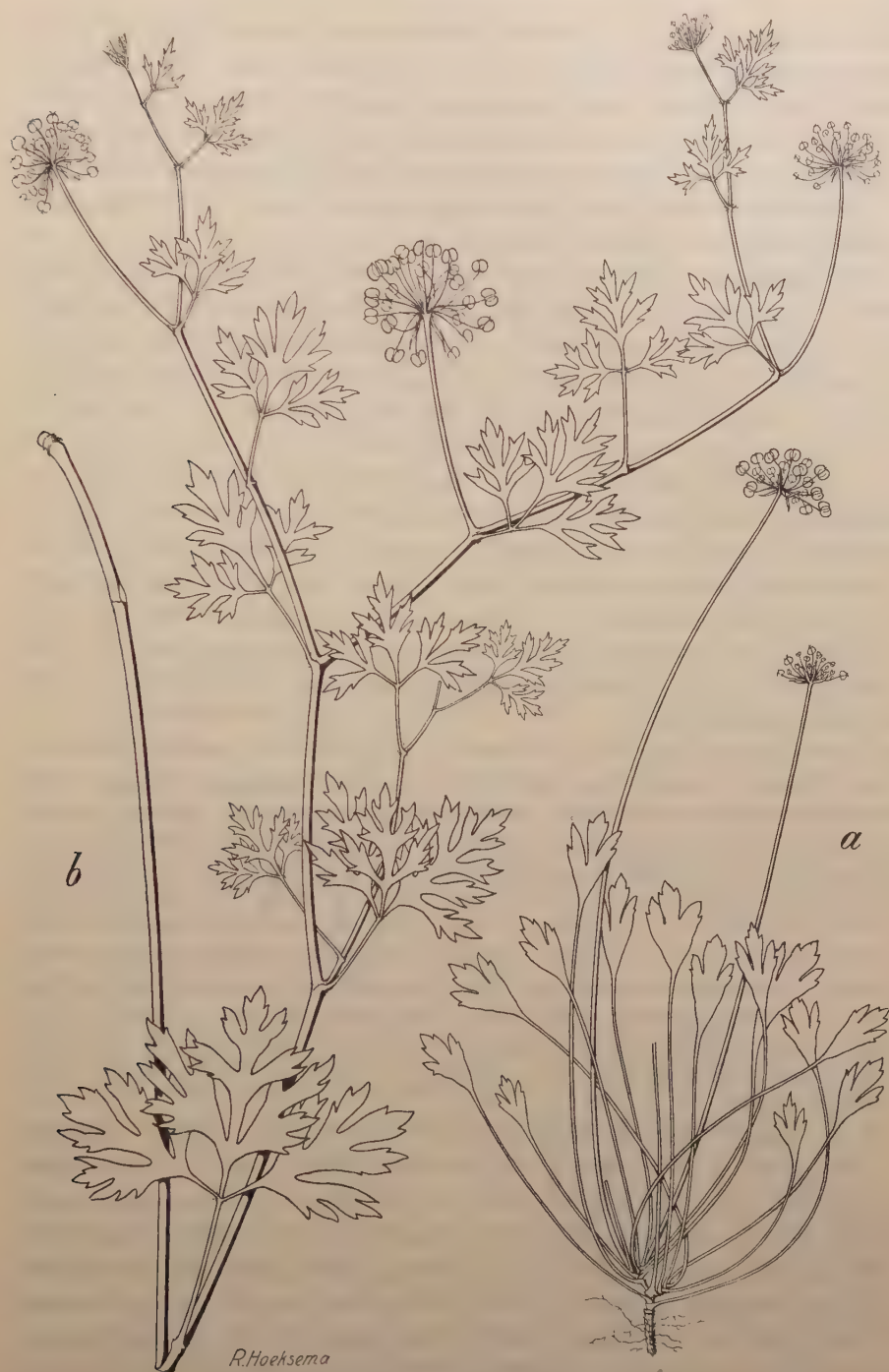


Fig. 2 — *Trachymene* (cf. p. 144, bottom).

0.25—0.5 mm longi, post anthesin paulum aucti; petala elliptica circiter 1.5 mm longa, 0.75 mm lata; styli ad 0.75 mm longi. Mericarpia ad 3 mm longa, 1.5 mm lata, glaberrima, aequaliter evoluta, jugis intermediis circiter 0.75 mm a commissura remota; carpophorum indivisum, 4-apiculatum, utrinque profunde sulcatum, statu vieto tantum bifidum.

Didiscus saniculifolius var. *novoguineensis* DOMIN, in Sitzungsber. Böhm. Gesellsch. Wissensch., 1908, p. 67.

Trachymene novoguineënsis is closely allied to *Tr. saniculaefolia* but differs constantly by cuneate laminae which always are more long than broad. Moreover the peduncles are always remarkably long in proportion to the leaves, it generally has a denser growth, and specimens with prolonged stems bearing rosettes are not known. As to the hairiness, it varies in the same way as *Tr. saniculaefolia*.

Among the materials of the latter from Mt. Kinabalu there are specimens (CLEMENS 10538 and NATIVE COLLECTOR 44) that through broadly cuneate laminae show an approach towards *Tr. novoguineënsis*, but these laminae are always more broad than long and for the rest the specimens are in no way different from typical *Tr. saniculaefolia*. On the other hand *Tr. novoguineënsis* is somewhat like an intermediate between *Tr. saniculaefolia* and *Tr. koebreensis*, but intermediate forms between the three are unknown.

NEW GUINEA. Foot of the Doorman Top, on peaty level ground, 3250 m el., LAM 1586 (B), common from 2900—3300 m el., all green parts exposed to the sunshine tinged with red, corolla light-pink, fruit dark-red on yellowish pedicels; Doorman Top, 3500 m el., steep slope with rock fragments, LAM 1659 (B), green parts exposed to the sunshine somewhat tinged with red, corolla and stamens creamy-white, fruit reddish-yellow; Doorman Top, in marshy ravine with grasses, near to the summit, 3500 m el., LAM 1692 (B), green parts somewhat tinged with red, corolla and stamens white or slightly violet, fruit brown-yellow or tinged with red; S.W. New Guinea, BRANDERHORST (?) 146 (B); Wichmann Mts., 3000 m el., summit, PULLE 975 (B), petioles, peduncles and flowers violet, fruit dark-violet; Hubrecht Valley, 3000 m el., VON RÖMER 1339 (B), fruit-bearing inflorescences only; Mt. Scratchley, 3660 m el., GIULIANETTI s.n. (K), originals of *Didiscus saniculifolius* var. *novoguineensis* DOMIN.

3. *Trachymene koebreensis* (GIBBS) BUWALDA, nov. comb. — Fig. 1a. — Perennial herb, entirely glabrous, with a caudex nearly 4 mm thick. Stems prostrate, nearly 2 mm thick at the base, to 40 cm long, bearing leaves over the whole length and rosettes in the leaf axils, densely beset with swollen bases of petioles in the basal part and below the rosettes, forming branches from the axillary rosettes and again forming rosettes in the axils of the leaves. Petiole with sheath 1—2 cm long, always shorter than the lamina; sheath nearly 2 mm long 3 mm broad, tapering

into the petiole; petiole canaliculate above; lamina cuneate, tapering into the petiole, 1—2 cm long, 0.5—1 cm broad below the apex, with 3—5 triangular acute teeth in the apical part, the middle teeth 4—7 mm long, 1.5—3 mm broad, the lateral ones smaller, 1.5—2 mm long, nearly 1 mm broad. Peduncle 6.5—8.5 cm long, terete, striate; involueral bracts 5—7, lanceolate, acute, nearly 6 mm long 0.5 mm broad; pedicels 15—30 in each umbel, the outer ones to 5 mm long, the inner ones shorter, spreading when flower-bearing, somewhat incurved when fruit-bearing. Calyx teeth narrowly triangular or subulate, 0.75—1.5 mm long, to 0.4 mm broad, sometimes somewhat unequally developed; petals obovate, nearly 1.25 mm long, 0.75 mm broad; styles nearly 1.25 mm long. Mericarps to 2.5 mm long, 1.5 mm broad, entirely glabrous; distance between the jugae intermediae and the commissure 0.5—0.75 mm.

Didiscus koebrensis GIBBS, Contr. Arfak Mts. (1917) p. 165.

Tr. koebrensis is somewhat an intermediate between *Tr. novoguineënsis* and *Tr. rigida*; as to the leaves it resembles more *Tr. novoguineënsis*, though the lamina is always longer than the petiole; as to the habit it is more like *Tr. rigida*.

NEW GUINEA. Arfak Mts., Mt. Koebré, abundant in open burnt summit plateau, 2700 m el., GIBBS 5606 (BM, type, K, L), stems spreading.

4. *Trachymene rigida* BUWALDA, n. sp. — Fig. 1b—d. — Herba perennis, omnino glabra. Caudex ramosus, rosulas et ex eis saepe caules prolongatos proferens; caules procumbentes, parte inferiore ad 2.5 mm crassi, angulati, sulcati, nodis incrassatis, primum umbellam singulam terminalem ferentes, deinde e nonnullis axillis superioribus rosulas paucifolias et ex eis caules proferentes umbella terminali unica, denique saepe eodem modo iterum ramificans. Folia vagina 1—3 mm longa et lata, utrinque appendicibus nonnullis subulatis rigide coriaceis ad 3 mm longis ciliata; petiolus ad 2 cm longus, 1 mm latus, difficile a lamina distinguendus; folium, petiolo incluso, 2—9 cm longum, lamina 4—7 mm lata, crasse et rigide coriacea, anguste cuneato-spathulata, prope apicem dentibus 1—5 plerumque 3 obtuse triangulis 1—2 mm latis ad 3 mm longis, margine ceterum integro, nonnihil recurvo. Pedunculus 5.5—11 cm longus, 0.5—1.5 mm crassus, angulosus, sulcatus; involucri bractee 10—12, lanceolatae, 5—10 mm longae, 0.5—1.5 mm latae, acutae vel subobtusae; pedicelli 20 vel plures, 2—4 mm longi, floriferi paulum divaricati, fructiferi erecti. Calycis dentes 0.25—0.75 mm longi obtusi, persistentes; petala oblongo-ovata, 1.5—2 mm longa, 1 mm lata; styli 1.5—2 mm longi. Mericarpia ad 3 mm longa, 2.5 mm lata, aequalia, jugis intermediis 0.5—1 mm a commissura remotis.

Didiscus odontocoleus BUWALDA, ex VAN STEENIS, in Bull. Jard. Bot. Buitenzorg, sér. III, 13, p. 255 (1934), nomen.

Trachymene rigida differs from all other *Trachymene* species known, through its narrowly cuneiformous, thickly coriaceous leaves, but, as to its mode of growth, it entirely agrees with *Tr. koebrensis* and even with *Tr. saniculaefolia*. Its peculiar leaf-shape is connected with that of *Tr. saniculaefolia* by that of *Tr. koebrensis* and of *Tr. novoguineënsis*.

NEW GUINEA. Doorman Top, open slope between rocks, LAM 1645 (B), all parts exposed to the sunshine tinged with dark violet, corolla white inside, filaments pale green, anthers lilac, fruit dark-violet or brownish.

5. *Trachymene acrotricha* BUWALDA, n. sp. — Fig. 1e—f. — Herba perennis. Caudex ad 3 cm longus et 3 mm crassus, apicem versus rudimentis foliorum incrassatis dense vestitus. Caules ad 13 cm longi, basi circiter 2 mm crassi, prostrati, sulcati, parte inferiore glabri, parte superiore pilis divaricatis ad 1.5 mm longis in costis insertis densiuscule hirsuti. Folia sparsa (rosulae desunt); vagina ad 4 mm longa 2 mm lata, in petolium attenuata, margine pilis ad 3 mm longis ciliata; petiolus ad 7 mm longus, canaliculatus, pilis ad 2 mm longis dense hirsutus; lamina foliorum inferiorum circuitu reniformia, foliorum superiorum late rhomboidea, circiter 7 mm longa 10—15 mm lata, tripartita vel trifida, segmentis cuneatis parte apicali dentibus latis omnibus in pilum apicalem exeuntibus, subcoriacea, statu sicco involuta, palminervia, facie superiore glabra, inferiore nervis pilis 1—2 mm longis sparse hirsuta. Umbellae in parte superiore caulium foliis oppositae; pedunculus 0.5—2 cm longus, teres, incurvatus, pilis ad 1.5 mm longis dense hirsutus; bracteae involuerantes 8—10, lanceolatae acutae, 4 mm longae, circiter 1 mm latae, canaliculae, glaberrimae, margine dentatae, dentibus et apice pilo terminali ornatae; pedicelli 10—22, exteriores ad 4 mm longi, interiores breviores, glaberrimae, apice nonnihil dilatatae. Calycis dentes 0.5—1 mm longi, basi 1 mm lati, triangulares acuti; petala elliptica, circiter 1.5 mm longa, 1 mm lata, apiculata; styli ad 0.75 mm longi. Mericarpia 2.25—3 mm longa, 1.5—2 mm lata, glaberrima, jugis indistinctis, carinalibus paulo distinctioribus quam suturalibus, intermediiis 0.5—0.75 mm a commissura remotis; carpophorum 1.5 mm longum, filiforme, biapiculatum.

A peculiar small plant from stony localities on high mountain tops, agreeing with the foregoing species, especially *Tr. koebrensis*, by the mode of growth of its stems, but entirely different as to the shape of the leaves and the peculiar hairs on the tips of the leaf teeth.

SELEBES. B. Rante Mario, on mountain heath, 3100 m el., KJELLBERG 3884 (B), flowers white, plant reddish.

6. *Trachymene erodioides* BUWALDA, n. sp. — Fig. 1g—h. — Herba, ex fragmentis notis parva. Caulis repentes, 0.5—1 mm crassi, teretes, nodis nonnihil incrassatis rudimenta foliorum incrassata ferentibus, pilis 1—2 mm longis magis vel minus hirsuti (probabiliter ramosi more specierum praecedentium). Folia singula et in rosetulis paucifoliis axillaribus disposita; vagina c. 2 mm longa 1 mm lata, sensim in petiolum attenuata, extus dense pilosa, basi pilis ad 5 mm longis, dorso et margine pilis 1—3 mm longis; petiolus 1.5—4 cm longus, canaliculatus, pilosus, pilis 1—2 mm longis crispatis divaricatis; lamina 1.5—2.5 cm longa, 1—2 mm lata, circuitu ovato-triangularis nonnihil hastata, utrinque parce pilosa pilis 1—2 mm longis crispulis, tripartita vel ternata, segmento terminali triangulari-rhomboideo, 1—2 cm longo, 0.5—1.5 cm lato, lateralibus 5—12 mm longis 5—7 mm latis, ovatis, omnibus basin versus pennatifidis, apicem versus crenatis, apicibus omnibus brevissime acuminatis. Umbellae terminales vel formatione rosularum axillarium laterales; pedunculus adscendens, 2.5—3.5 cm longus, tenuis, teres, striatus, densiuscule pilosus, pilis crispulis 1—2 mm longis; bracteae involuerantes 5—6, lanceolatae, 3—5 mm longae, glabrae vel parce ciliatae; pedicelli 12—15, exteriores ad 7 mm longi, interiores breviores, glaberrimi. Flores desunt; calycis dentes (in fructu) subnulli vel parvi ad 0.25 mm longi; styli c. 0.5 mm longi. Mericarpia 2.5—3 mm longa, c. 2 mm lata, glaberrima, aequalia vel subaequalia, jugis intermediis c. 0.75 mm a commissura remotis.

Didiscus erodioides BUWALDA, ex VAN STEENTIS, in Bull. Jard. Bot. Buitenzorg, sér. III, 13, p. 255 (1934) nomen.

This peculiar new species is only known from rather small detached fruit-bearing stem fragments, but is entirely different from all other species of the genus by the peculiar leaf-shape. In mode of growth it probably agrees with the preceding species.

SELEBES. B. Poka Pindjang, mountain heath, 2700 m. el., KJELLBERG 3885 (B), rare.

7. *Trachymene celebica* HEMSLEY — Perennial herb, with a caudex terminated by rosettes, from which originate erect flower-bearing stems and lateral rosettes either sessile, or on short stolones originating from the upper axils. Stems terminal in the rosettes (seemingly lateral when the rosette is dying off and new lateral rosettes have developed from it) erect or ascending, 20—50 cm high, nearly terete, more or less ribbed, 3—5 mm thick in the lower portion, more or less densely hirsute with 2—3 mm long spreading hairs, little-branched and few-leaved in the lower portion, not bearing rosettes in the axils, but terminated by a corymbiform inflorescence of umbels. Rosette leaves with sheaths 1—

2 cm long, 7—13 mm broad, glabrous outside in the basal portion, hirsute like the stem towards the apex, ciliate in the upper portion with 2—4 mm long hairs; petioles 5—15 cm long, hirsute like the stems; laminae roundish in outline, deeply cordate, 5—13 cm long, 7—14 cm broad, 3—7-palmatifid with obovate, 3-lobed, moreover biserrate, segments, more or less densely hirsute on both sides with nearly 1 mm long hairs; cauline leaves and bracts of the inflorescence gradually smaller and shorter-petioled, the uppermost ones nearly sessile, with less numerous and narrower segments and smaller sheaths. Umbels placed in a terminal corymbiformous dichasium of umbels; lower peduncles 2.5—6 cm long, upper ones gradually shorter, all of them angular, grooved, hirsute like the stems. Involucral bracts numerous, narrowly lanceolate, nearly 10 mm long, 1 mm broad, long-acuminate, with 0.5—1.5 mm long hairs at the margin and on the midrib, appressed to the pedicels. Flowers numerous (more than 50) in each umbel, the outer ones not fruiting; pedicels spreading when flower-bearing, incurved when fruit-bearing, the outer ones to 17 mm long, the inner ones gradually shorter. Calyx teeth acute, small; petals elliptic, acute, nearly 2.5 mm long, 1.5 mm broad; styles nearly 3 mm long. Mericarps nearly 4 mm long, 3 mm broad, with persistent calyx teeth and styles, the jugae intermedia 0.5—1.25 mm remote from the commissure; carpophore entire.

Trachymene celebica HEMSLEY, in Kew Bull., 1896, p. 37; in HOOKER, Ic. pl., 25, t. 2487 (1896); *Didiscus celebicus* SARASIN, Reisen in Celebes, 2 (1905) p. 337; DOMIN, in Sitzungsber. Böhm. Gesellsch. Wissensch. (1908) p. 68; WOLFF, in ENGL. & PR., Natürlich. Pflanzenfam., Nachtr. 4 (1915) p. 222; GIBBS, Contr. Arfak Mts. (1917) p. 166; VAN STEENIS, in Bull. Jard. Bot. Buitenzorg, sér. III, 13, p. 255 (1934); *Didiscus buginensis* WOLFF, in FEDDE, Repert., 17, p. 439 (1921).

This species, mainly known from one mountain summit, is little polymorphic. The form described by WOLFF as *Didiscus buginensis*, from another mountain, is different by its being less hairy in all parts and by the more acute leaf-segments, but these differences certainly are insufficient for specific distinction in this genus.

. SELEBES. S.W. peninsula, Bowolangi, SARASIN 2155 (BD, type of *Didiscus buginensis* WOLFF); G. Bantaeng (= G. Lompobatang), N.W. slope, 2300 m el., BÜNNEMEIJER 11898 (B, BD, L, S, U), flowers white, fruit red, stems red near the base, the roots are eaten raw as a medicament against stomach-ache, v.n.: *kriongo edja*; 2600 m el., BÜNNEMEIJER 12170 (B, L), petioles red, flowers white, fruit red; 3000 m el., EVERETT 73 (S), 74 (S, K, type of *Trachymene celebica* HEMSLEY); 2700 m and higher, in crevices of rocks, SARASIN 1276 (BD), flowers white, stems and indumentum beautifully crimson, gathered by the natives for medicinal purposes;

Gowa, near top, 2700—2850 m el., VAN ZIJLL DE JONG 10 (B), v.n.: *djahé mérah*, stony, steep locality, bare volcanic rocks, rather common, flowers white, leaves green, petioles bright red.

8. **Trachymene Sarasinorum** (WOLFF) BUWALDA, nov. comb. — Mode of growth as in the preceding species. Stems erect, 30—40 cm high, terete, striate, sparingly hirsute, more densely at the nodes. Leaves nearly all in a rosette; sheaths 3—6 mm long, 5—8 mm broad, with 1—2 mm long hairs on the back and at the margin, abruptly contracted into the petiole; petiole 6—8 cm long, hirsute with 1—2 mm long hairs, more densely hirsute towards the lamina; lamina roundish in outline, deeply cordate, 4—4.5 cm long, 6—7 cm broad, ternate, the middle leaflet rhomboid nearly 4 cm long, 3.5 cm broad, 3-partite with 2—3-lobed coarsely serrate segments, the lateral leaflets hardly smaller, obliquely trifid with 2—3-lobed, coarsely serrate segments, the whole lamina rather sparingly appressedly hirsute on both sides; cauline leaves smaller, shorter-petioled, the bracts of the dichasium nearly sessile. Peduncles of the umbels 3—4 cm long, terete, striate, shortly hirsute; involueral bracts numerous, 7—10 mm long, nearly 0.5 mm broad, narrowly lanceolate, acuminate, with few nearly 1 mm long hairs at the margins and on the midrib, spreading during flowering, appressed later; pedicels 7—11 mm long, nearly glabrous, spreading, somewhat erect when fruit-bearing. Calyx teeth nearly 2.5 mm long, subulate; petals ovate, 2—2.5 mm long, 1 mm broad; styles nearly 2 mm long. Mericarps nearly 4.5 mm long, 3.5 mm broad, entirely glabrous, usually equally developed or one somewhat smaller; carpophore entire.

Didiscus Sarasinorum WOLFF, in FEDDE, Repert., 17, p. 440 (1921); VAN STEENIS, in Bull. Jard. Bot. Buitenzorg, sér. III, 13, p. 255 (1934).

Trachymene Sarasinorum shows one important difference with *Tr. celebica*, viz. the long, nearly filiformous calyx teeth. For the rest it differs so little from it, that it could hardly be distinguished as a variety. The more acute leaf segments also occur in the specimen described by WOLFF as *Didiscus buginensis*, which is reckoned to *Tr. celebica* here.

SELEBES. Southern Peninsula, Piek van Maros (not „Piekumhardt”), 1100 m el., SARASIN 1122 (BD, type), flower white, the plant had to be killed with hot water before it could be dried, like Orchidaceae, Liliaceae, &c.

9. **Trachymene acerifolia** NORMAN — **Fig. 3.** — Stem herbaceous, 20—45 cm high, erect and terete in the lower portion, 3—8 mm thick near the base, terete or somewhat angular and gradually less thick upward, with spreading branches in the upper portion, the branches with inflorescences opposite to the leaves, all densely velvety hairy with

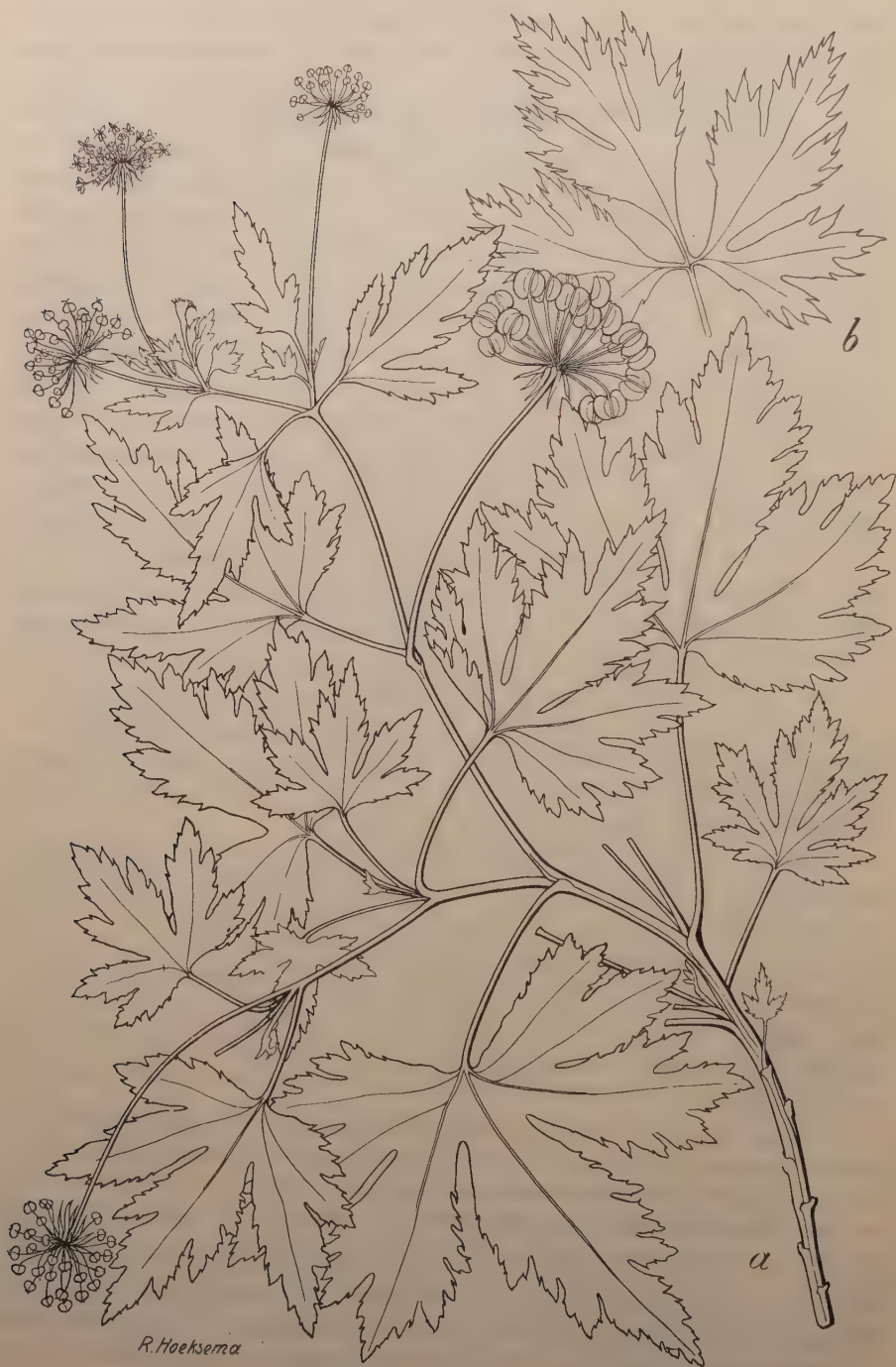


Fig. 3 — *Trachymene acerifolia* (cf. p. 153, bottom).

yellowish-brown indumentum to glabrous in the young state, glabrescent later. Leaves more or less hirsute to glabrous on both sides, rather densely placed in the lower portion of the main stem (but not forming rosettes) with distances of less than 1 cm, more remote in the upper part and along the branches; petioles of the lower leaves longer than the lamina, to 13.5 cm long, those of the upper leaves gradually shorter, those of the uppermost leaves nearly none, all of them slightly sheaty at the base, hairy like the stem; lamina palmatifid to ternate, with 3—5 rhomboid to obovate segments, the middle of which is 3-lobate to 3-fid, all of them moreover biserrate with acuminate teeth; lamina of the upper leaves smaller and more cuneate at the base. Umbels opposite to the leaves; peduncles 1—5 cm long when flowering, up to 7 cm long afterwards, terete, grooved, hairy like the stem; involucre with 7—10 bracts, shorter than or as long as the pedicels, lanceolate, up to 3 mm broad, hairy like the leaves; pedicels 25—40 in each umbel, spreading, the outer ones up to 7 mm long when flower-bearing, up to 15 mm long when fruit-bearing, the inner ones somewhat shorter. Calyx teeth to 0.5 mm long, acute or obtuse; petals elliptical, to 2 mm long and nearly 1 mm broad, acute; styles nearly 0.5 mm long in the flower, up to 1.5 mm long on the fruit. Mericarps to 6 mm long, 4 mm broad, equally developed, the distance between the jugae intermediae and the commissure 1.5—2 mm; carpophore entire or shortly bifid at the tip. (Description after the Timor and Flores plants).

Trachymene acerifolia NORMAN, in Journ. Bot., 69, p. 287 (1931); *Didiscus acerifolia* VAN STEENIS, in Bull. Jard. Bot. Buitenz., sér. III, 13, p. 255 (1934), p. 404 (1935).

This species has been based on specimens collected by Mrs. WALSH on Mt. Moetis, in Timor, and preserved in the herbarium of the British Museum. Other specimens of the same number extant in the Buitenzorg herbarium, and plants collected later by DE VOOGE on the same mountain, entirely agree with the type specimens. A somewhat different form has been collected later in the island of Flores; it differs in the very scarce indumentum and the thinner and deeper-divided ternate leaves. As there is, in my opinion, no doubt whether this form belongs to the same species, the above description has been made after all the Timor and Flores materials.

The specimens from Selébes, mentioned below, are more different

and do not belong with certainty to the same species, but the materials extant are too imperfect to base a new species upon them. They have stronger developed leaf sheaths, and involucre composed of broader bracts and enclosing the flowers in the young state. The number HEINRICH 265 has thin, nearly glabrous leaves, cuneate to truncate at the base, the peduncles to 2.5 cm long, shorter than the petioles, and the flowers probably purple; it is indicated on the label as a shrub, semi-liane. The number KJELLBERG 3886 has the leaves deeply cordate, thicker, and sparsely hairy, the peduncles to 5 cm long, longer than the petioles, the flowers pink; it is indicated on the label as a shrub. Both specimens are detached extremities of flowering stems.

TIMOR. Goenoeng Moetis, summit, 2365 m el., WALSH 345 (B, BM, type), in one locality only, flowers cream coloured; G. Moetis, 2000 m el., DE VOOGE 2300 (B), very common.

FLORES. Goenoeng Kasteno, N.W. slope at 1800 m el., in primary forest, POSTHUMUS 3236 (B).

SELEBES. S.E. part, Mengkoka Mts., 2000 m el., HEINRICH 265 (BD), shrub; B. Poka Pindjang, 2600 m el., KJELLBERG 3886 (B), in damp valley, rare, shrub nearly 1 m high, semi-liane, flower pink.

10. *Trachymene arfakensis* (GIBBS) BUWALDA, nov. comb. — Fig. 2b. — Stems herbaceous, more or less erect, glabrous, long and slender, to 50 cm long, 3–6 mm thick and showing scars and remnants of leaf-sheaths (of rosette leaves?) at the thickened base, unbranched and nearly 3 mm thick in the lower portion, terete, striate to slightly sulcate, several times dichotomously branched in the upper portion, the branches spreading and sympodic, their nodes alternately with and without umbel opposite to the leaf. Leaf sheaths 2–7 mm long, 1.5–4 mm broad, tapering into the petiole, ciliate with hairs up to 2 mm long; petioles 2–7 cm long in the lower leaves, gradually shorter in the upper ones, canaliculate, glabrous or with few hairs up to 2 mm long towards the lamina; lamina roundish-cordate in outline, 2.5–7 cm long by 4–8 cm broad in the lower leaves, gradually smaller in the upper leaves, ternate, the leaflets with petiolules to 1.5 cm long, 2–3-fid to 2–3-partite, the segments 3-lobed and coarsely serrate, the teeth slightly acuminate and apiculate, the upper surface nearly glabrous, the lower surface sparingly hirsute, especially on the nerves, the base ciliate with hairs up to 2 mm long. Umbels opposite to each other leaf; peduncles 1.2–7 cm long, terete to sulcate; involucre bracts 5–10 in number, 5–10 mm long, linear to filiformous, the broadest ones with few filiformous teeth; pedicels 20–30 in number, the outer ones 5–8 mm long when flower-bearing, 10–15 mm long when fruit-bearing, spreading, the inner ones shorter. Calyx teeth

hardly any; petals 1—1.5 mm long, 0.75—1 mm broad, ovate, acute; styles 1—1.5 mm long. Mericarps up to 5 mm long, 3 mm broad; carpophore entire, biapiculate with blunt tips; distance between the jugae intermediae and the commissure 0.5—1.5 mm.

Didiscus arfakensis GIBBS, Contrib. Arfak Mts. (1917) p. 166; VAN STEENIS, in Bull. Jard. Bot. Buitenzorg, sér. III, 13, p. 255 (1934).

This species is closely allied to *Tr. acerifolia*, but is different by its being more slender and smaller in all parts, *e. g.* by smaller flowers and fruit, by the main stem not bearing densely placed leaves in its lower portion, but perhaps bearing real rosettes at its base, by umbels not opposite to each leaf but to each other leaf of the branches, and by ternate leaves with petiolulate leaflets. Ternate leaves are also found in the Flores variety of *Tr. acerifolia*, but here the leaflets are not distinctly petiolulate and the teeth are longer and more acute.

SELEBES. Bohaa Mts., 1500—1700 m el., SARASIN 2072 (BD), herbaceous, to 2 m high, flowers white.

NEW GUINEA. Arfak Mts., S.W. ridge, Angi Lake, open spaces, 2400 m el., GIBBS 5513 (BM, type); near Angi Lake, 1900 m el., marshy banks, on muddy granite soil, GJELLERUP 1087 (B), herb, 0.75 m high, flowers white, stems brownish, leaves dull-green; ibidem, in peaty places of the bank, dry places in muddy humus on granite soil, GJELLERUP 1128 (B), herb, 0.5 m high, in groups, stems green with reddish hue especially at the nodes, flowers white.

11. *Trachymene adenodes* BUWALDA, n. sp. — Fig. 4a—b. — Caulis herbacei, teretes, striati, ad 42 cm longi et ultra, parte inferiore adscendentes, simplices, 4 mm crassi, glabri, parte superiore ramosi ramis primum dichotomis deinde sympodiceis, pilis ad 2 mm longis subdense hirsutis. Folia in caulis parte inferiore 0.3—1 cm, ceterum magis distantia; vagina 5—8 mm longa, 3—5 mm lata, semiamplexicaulis, sensim in petiolum attenuata, glabra, margine ciliis ad 3 mm longis, partim glanduliferis; petioli foliorum inferiorum quam lamina longiores, 7—17.5 cm longi, superiorum gradatim breviores, summorum subnulli, parte inferiore parce pilosi, versus laminam densius hirsuti pilis glanduliferis ad 3 mm longis; lamina foliorum inferiorum ad 4.5 cm longa, ad 6 cm lata, circuitu rotundato-cordata vel subreniformis, 3—5-partita segmentis rhomboido-ovatis, medio trifido partibus 2—3-lobis, omnibus apicem versus serratis dentibus latis nonnihil acuminatis subapiculatis, utrinque parce pilosa pilis adpressis ad 2 mm longis passim glanduliferis, margine praesertim in incisionibus ciliis ad 2 mm longis. Umbellae foliis oppositae et in bifurcationibus; pedunculi inferiores ad 10 cm longi, superiores breviores, omnes apicem versus pilis glanduliferis ad 1 mm longis hirsuti; involucri ante anthesin floribus longius, alabastra in-



Fig. 4 — *Trachymene* (cf. p. 157, bottom).

cludens, bracteis 6—8 lanceolatis acutis 7—10 mm longis, 1—1.5 mm latis, glabris, pilis ad 1.5 mm longis ciliatis; pedicelli circiter 30, exteriores 7—9 mm longi, interiores breviores, glaberrimi. Calycis dentes c. 0.25 mm longi, late triangulares; petala obovata, circiter 1.5—2 mm longa, 1—1.5 mm lata; styli c. 1.5 mm longi. Fructus maturi desunt, submaturi ad 2 mm longi 3.25 mm lati, glaberrimi, jugis intermediis a commissura circiter 0.5 mm distantibus.

In general appearance this new species comes near to *Tr. arfakensis*, but it is more robust and also resembles *Tr. acerifolia*. From both it differs by its glandular indumentum of the petioles, stems, and peduncles.

NEW GUINEA. N.E. part, Saruwaged Mts., Bolan, 2400—3000 m el., KEYSER s.n. (BM).

12. *Trachymene papillosa* BUWALDA, n. sp. — Fig. 4c—d. — Caules herbacei, probabiliter adscendentes, 20—40 cm longi, simplices vel in parte superiore ramosi, teretes, dense papilloso et superca pilis rigidis circiter 1 mm longis hirsuti. Folia sparsa (rosulae desunt); vagina 2—3 mm longa, 2 mm lata, semiamplexicaulis, in petiolum attenuata, papillosa ut caulis, superca ciliata pilis 1—2 mm longis; petiolus 0.5—2.5 cm longus, hirsutus et papillosus ut caulis; lamina circuitu orbiculari-reniformis, 1—2 cm longa, c. 3 cm lata, ternata, foliolis rhomboideis 1—2 cm longis 1—1.5 cm latis, basi valde attenuatis, 2—3-fidis vel 2—3-partitis, segmentis terminalibus saepe biserratis, versus basin papilloso, sparse hirsutis utrinque. Umbellae terminales ad apices caulium et ramorum, saepe foliis oppositae; pedunculus 3—6 cm longus, teres, striatus, hirsutus papillosusque ut caulis; bractee involucrantae 6—12, lineari-lanceolatae, acutae, 4—5 mm longae, 0.5—1 mm latae, glabrae, pilis nonnullis ad 1.5 mm longis ciliatae; pedicelli 30—50, exteriores ad 5 mm longi, interiores breviores, glabri levesque, floriferi divaricati, fructiferi magis erecti. Calycis dentes 0.25—0.5 mm longi latique, triangulares, aequales; petala ovata, acuta, c. 1.5 mm longa; ovarium squamulis minimis; styli 1—1.5 mm longi. Mericarpia atra, ad 2 mm longa, ad 2 mm lata, aequalia, jugis intermediis 0.5—0.75 mm a commissura remotis, trichomatibus tuberculiformibus ornata, praesertim inter jugas intermedias et commissuram; carpophorum integrum, vix biapiculatum.

Didiscus scabriusculus BUWALDA, ex VAN STEENIS, in Bull. Jard. Bot. Buitenz., sér. III, 13, p. 255 (1934) nomen.

Fig. 4. — *a—b*: *Trachymene adenodes*, after KEYSER s.n. (BM); *a*: flowering stem, $\frac{2}{3} \times$; *b*: glandular hair of the petiole, $16 \times$; *c—d*: *Trachymene papillosa*, after VERSTEEG 1221; *c*: branched upper portion of a stem, $\frac{2}{3} \times$; *d*: mericarp, $4 \times$.

This new species comes nearest to *Tr. arfakensis* by its mode of growth, but is different by its smaller dimensions, the papillose surface of its stems, sheaths and petioles, and the peculiar knob-shaped trichomes on the ripe fruit.

NEW GUINEA. S.W. part, probably Hellwig Mts., VERSTEEG 1221 (B, type), herb, flowers reddish-white; near Waterval Bivouac, 3300—3500 m el., VAN NOUHUYS 24 (U).

13. *Trachymene rosulans* (DANSER) BUWALDA — Perennial (or annual?) herb. Primary root fusiformous, branched. Main stem erect, to 13 cm long, to 2.5 mm thick at the base, almost covered with the thickened bases of leaf-sheaths in the lower portion, producing branches from the basal part, that are procumbent or adscendent, with scale-like leaves, to 14 cm long, and other branches from the upper portion that are like the upper portion of the main stem, the whole plant forming a semi-globose whole. Leaves scattered, more densely placed towards the extremities of the stems, somewhat forming terminal rosettes; sheath 2—12 mm long, to 3 mm broad, with a membranous margin, tapering into the lamina; lamina 8—18 mm long, 3—9 mm broad, spatulate, with 3 acute or obtuse teeth in the apical portion, the middle tooth to 2 mm long and 2.5 mm broad, the lateral teeth to 1 mm long and broad. Umbels opposite to the leaves; peduncle 5—12 mm long, terete, striate; involucrel bracts 8—12 in number, lanceolate, 6—9 mm long, to 1.5 mm broad; pedicels 10—20 in number, the outer ones 4—7 mm long, the inner ones shorter, hardly longer after flowering. Calyx teeth to 0.75 mm long, triangular, acute; petals roundish-elliptical, nearly 1.5 mm long, 1 mm broad; styles nearly 1.25 mm long. Mericarps to 3.5 mm long, to 3 mm broad, entirely glabrous, the distance from the jugae intermediae to the commissure 0.75—1.25 mm; carpophore entire, bi-apiculate, 2—2.5 mm long.

Didiscus rosulans DANSER, in Brittonia, II, 2 (1936) p. 135, cum icone.

In the mode of growth this species is entirely different from all species of the genus described in this paper.

NEW GUINEA. S.E. part, Wharton Range, Murray Pass, burnt fringes of forest, BRASS 4513 (NY, L, type), common, leaves pale, fleshy, flowers pink; ibidem, grasslands, 2840 m el., BRASS 4177 (NY), common, leaves smooth and shining, pale green, flowers pale pink.

14. *Trachymene caerulea* (HOOKER) GRAHAM — Annual herb, erect, pilose and glandulose in nearly all parts. Primary root fusiformous, with fibrous branches. Stem single, erect, unbranched in the lower portion, with branches in the upper portion usually simple and not overtopping the main stem. Lower leaves petioled, the petiole 1.5—4 cm long, hardly

sheathy, the lamina roundish in outline, ternate, with bipennatifid to bipennatipartite leaflets, with narrow segments and subacute to subobtuse apiculate tips; upper leaves sessile or subsessile, less divided, the uppermost ones with only 3 narrow segments. Umbels terminal to the main stem and its branches, many-flowered; involueral bracts numerous, linear, nearly filiformous towards the tip, nearly as long as the flowers; pedicels of the outermost flowers 10—25 mm long, the interior gradually shorter, the innermost ones very short, spreading when flower-bearing, more erect later. Outermost flowers larger than the other ones, not fruit-bearing, probably male; calyx teeth subulate, very short; petals ovate to obovate, 2.75—3 mm long, 2—2.25 mm broad, shortly unguiculate at the base, with short glandular hairs at the outside; styles nearly 1 mm long; ovary glandular-hairy. Mericarps 3.25 mm long, up to 2.75 mm broad, roughly tuberculate with glandular hairs; distance between the jugae intermediae and the commissure 0.5 mm. (Description after Australian materials in the Leiden Herbarium.)

Didiscus caeruleus HOOKER, in Curt. Bot. Mag., 55, t. 2875 (1828); D. C., Prodr., 4 (1830) p. 72; DOMIN, in Sitzungsber. Böhm. Gesellsch. Wissensch. (1908) p. 43; WOLFF, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 222 (1915); *Trachymene caerulea* GRAHAM, in Edinb. New Phil. Journ., 5, p. 380 (1828); BENTHAM, Fl. austr., 3 (1866) p. 349; *Didiscus cyaneus* D. C., Mém. Ombellif. (1829) p. 28; *Huegelia caerulea* REICHENB., Iconogr. exot., t. 20 (1829).

JAVA. Pasoeroean, cultivated in gardens, BACKER s.n. (Pa).

Distribution: Australia.

IV. SANICULA

LINN., Sp. pl., ed. 1 (1753) 1, p. 235; Gen. pl., ed. 5 (1754) p. 109; BENTH. & HOOK.F., Gen. pl., 1, p. 880 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 670 (1879); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 615; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 137 (1898); WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 61 (1913) p. 48; THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 957 (1925).

Only species:

1. *Sanicula europaea* LINN. — Perennial herb with more or less creeping rhizomes. Stems 15—75 cm high, slender, deeply grooved, glabrous or rarely, like the whole plant, hairy. Lower leaves with a petiole 3—20 cm long, and a tripartite to ternate lamina with incised moreover serrate-crenulate segments, the teeth mucronulate. Umbels in

a dichasium terminating in monochasia, sessile or on peduncles up to 1.5 cm long, and with 5—8-leaved involuere, 4—6-flowered, with 2—3 outer male flowers on pedicels 0.5—1 mm long and 2—4 female flowers sessile or on pedicels up to 0.5 mm long. Calyx teeth distinct 1—1.5 mm long, 0.25 mm broad, oblong, acute; petals nearly 1.25 mm long, 0.5 mm broad, with exception of the inflexed tip. Mericarps nearly 2 mm long, 1 mm broad, densely covered with about 1.5 mm long uncinate bristles.

Sanicula europaea LINN., Sp. pl., ed. 1 (1753) 1, p. 235; D. C. Prodr., 4 (1830) p. 84; THWAITES, Enum. pl. Zeyl. (1859) p. 130; HIERN, in Fl. Trop. Afr., 3 (1871) p. 8; CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 670 (1879); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 616; TRIMEN, Handb. Fl. Ceyl., 2 (1894) p. 276; DRUDE, in ENGL. & PR., Nat. Pflanzenfam. III, 8, p. 137, ic. 56A (1898); KOORDERS-SCHUM., Syst. Verz., I, 1, fam. 228, p. 97 (1911); HALLIER, in Meded. Rijks Herb. Leiden, 12 (1912) p. 11; KOORDERS, Exkursionsfl. Java, 2 (1912) p. 724; WOLFF, in ENGLER, Pflanzenr., IV, 228, Heft 61 (1913) p. 61; RANT, in Trop. Nat., 3 (1914) p. 2; WOLFF, in ENGL. & PR., Nat. Pflanzenfam., Nachtr. 4 (1915) p. 224; BOLDINGH, Zakfl. Landbouwstr. Java (1916) p. 174; MERRILL, Bibl. Enum. Born. Pl. (1921) p. 458; RIDLEY, Fl. Mal. Pen., 1 (1922) p. 871; in Journ. Mal. Br. Roy. As. Soc., 1, p. 63 (1923); KOORDERS, Fl. Tjibodas, 2, p. 232 (1923); DOCTERS VAN LEEUWEN, in Flora, 118—119, p. 84 (1925); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 957, ic. 2329, t. 191, fig. 1 (1925); SENN, in Journ. Manch. Geogr. Soc., 41—42 (1925—1926) p. 4; SCHMUCKER, in Beih. Bot. Centralbl., 43, 2, p. 51, 66 (1927); DOCTERS VAN LEEUWEN, in Trop. Nat., 16 (1927) p. 118, ic. 26; 17 (1928) p. 104, 172; SCHRÖTER & BACKER, in Festschr. Hans Schinz (1928) p. 595; DE VOOGD, in Trop. Nat., 18 (1929) p. 194; RANT, in Nat. Tijdschr. Ned. Ind., 89, p. 451 (1929); VAN STEENIS, in Trop. Nat., 19 (1930) p. 89; DOCTERS VAN LEEUWEN, in Bull. Jard. Bot. Buitenzorg, sér. III, 11, p. 35, 49 (1930); DAKKUS, in Bull. Jard. Bot. Buitenzorg, sér. III, suppl. 1 (1930) p. 258; RIDLEY, Dispers. Pl. (1930) p. 591; DOCTERS VAN LEEUWEN, in Verh. Akad. Wetensch. Amsterdam, afd. Natuurk., sect. 2, XXXI (1933) p. 13, 17, 52, 68, 87, 124, 138, 196, 197, 218, ic. 41, tab. 18; FREY-WYSSLING, in Trop. Nat., 22 (1933) p. 5; VAN STEENIS, in Bull. Jard. Bot. Buitenzorg, sér. III, 13, p. 15, 16, 50 (1933), p. 256 (1934); *Sanicula elata* D. DON, Prodr. Fl. Nep. (1825) p. 183; D. C., Prodr., 4 (1830) p. 85; WIGHT & ARN., Prodr. Fl. Pen. Ind. Or. (1834) p. 367; MIQUEL, Ill. Fl. Arch. Ind. (1871) p. 40; BECCARI, Malesia, 1 (1877) p. 219; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 137 (1898); CHERMEZON, in LECOMTE, Fl. Indo-Ch., 2, p. 1141

(1923); *Sanicula javanica* BLUME, Bijdr. Fl. Ned. Ind., 15 (1826) p. 882; D. C., Prodr., 4 (1830) p. 85; HASSKARL, Cat. Pl. Hort. Bot. Bogor. (1844) p. 163; ZOLL. & MOR., in MORITZI, Syst. Verz. 1842—1844 (1846) p. 41; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 137 (1898); RIDLEY, in Journ. F. M. S. Museums, VIII, 4 (1917) p. 41; BAKER, in Journ. Bot., 62, suppl. (1924) p. 44; *Sanicula montana* BLUME, Catal. (1823) p. 54, nomen; Bijdr. Fl. Ned. Ind., 15 (1826) p. 882; D. C., Prodr., 4 (1830) p. 85; JUNGHUN, in Nat. & Geneesk. Arch. Ned. Ind., 2 (1845) p. 29; ZOLL. & MOR., in MORITZI, Syst. Verz. 1842—1844 (1846) p. 41; MOLKENBOER, in MIQ., Pl. Jungh., p. 93 (1851) cum var. *genuina*, *javanica*, *divaricata*; MIQUEL, Fl. Ind. Bat., I, 1, p. 736 (1856) cum var. *genuina*, *javanica*, *divaricata*; suppl. Sum. (1860) p. 134; TEYSMANN & BINNEND., Cat. pl. Hort. Bot. Bogor. (1866) p. 165; FILET, Plantk. Woordenb. (1876) p. 95; BECCARI, Malesia, 1 (1877) p. 219; in Bot. Jahrb., 1 (1881) p. 29; MOHNIKE, Blicke Pflanz. & Tierleben Nied. Malaienländern (1883) p. 268; WIGMAN in Teysmannia, 4, p. 742 (1893); MASSART, in Mém. Soc. Roy. Belg., 34, p. 222, 262, 265, 269, 338 (1895); DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 137 (1898); KOORDERS, in Nat. Tijdschr. Ned. Ind., 60, p. 371 (1901); WIGMAN, in Teysmannia, 15, p. 459 (1904); DE CLERCQ, Plantk. Woordenb. (1909) p. 321; ERNST, in Veg. Bild., 7 Reihe, Heft 1—2, Taf. 1—3 (1909); KOORDERS, in Bot. Jahrb., 50, suppl. (1914) p. 285; *Sanicula montana* var. *genuina* & var. *javanica* ZOLLINGER, Syst. Verz. Ind. Arch. 1842—1848 (1854) p. 138; *Sanicula elata* var. *normalis* & var. *partita* KUNTZE, Rev. gen. pl., 1 (1891) p. 269; *Sanicula europaea* var. *javanica* WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 61, p. 64 (1913); MERRILL, Enum. Phil. Fl. Pl., 3 (1923) p. 238.

The Malaysian *Sanicula europaea* is rather uniformous. BLUME distinguished a *Sanicula javanica* from a *S. montana*, the former with 5-lobed, the latter with ternate leaves. MOLKENBOER united the two under the name *S. montana*, but distinguished 3 varieties, *genuina*, *javanica*, and *divaricata*, mainly based on the length of the involucres and the development of the pedicels of the male and female flowers. MIQUEL (in Ill. Fl. Arch. Ind., p. 40) united this *S. montana* with *S. elata* D. DON, from the Himalaya. KUNTZE distinguished in this *S. elata* the varieties *normalis* and *partita*, the former with less, the latter with more strongly incised leaves. C. B. CLARKE rightly united all these forms with *S. europaea*.

The varieties distinguished by MOLKENBOER and KUNTZE are too slight to be named. The Malaysian form differs, however, more distinctly from the European form, by the umbels arranged in widely branched di-mono-

chasia, whereas the European form has more crowded inflorescences and the flowers consequently nearly arranged in a compound umbel.

The elevations on which *S. europaea* is found in Malaysia vary from 500—3060 m.

MALAY PENINSULA. Pahang, Telom valley, RIDLEY 13540 (S); Lubok Tamang, 1050 m el., HENDERSON 11033, 10953 (S).

SUMATRA. Above Takegeun, 1275 m el., VAN STEENIS 5981 (B); Berastagi, BURKILL 12 (S); Karo Plateau nr. Kabandjahé, 1200 m el., LÖRZING 6214 (B, L); nr. Siberaja, Laoebiang valley, 1150 m el., LÖRZING 9536 (B); Deleng Koetoe, 1250 & 1450 m el., LÖRZING 4951 (B); Toba Plateau, nr. Paranginom, 1300 m el., OUWERHAND 367 (B); central Habinsaran nr. Parsoboeran, ravine Aëk Gerat, 1000 m el., LÖRZING 7818 (B); Sumatra's Westkust, KORTHALS s.n. (L); G. Talakmau, plateau at 2800 m el., BÜNNEMEIJER 839 (B); G. Singgalang, BECCARI P.S. 331 (L); G. Singgalang, 1050 m el., MATTHEW s.n. (K); 1650 m el., BÜNNEMEIJER 2579 (B, L, S); 2500 m el., BÜNNEMEIJER 2659 (B, L, U); forest above 2000 m el., LEEFMANS 27 (B); G. Talang, 2200 m el., BÜNNEMEIJER 5544 (B); G. Marapi, 1850 m el., BÜNNEMEIJER 4586 (B, L, S, U); 2650 m el., BÜNNEMEIJER 5018 (B, BD, L, U); G. Malintang, 1100 m el., BÜNNEMEIJER 3562 (B, BD, L, S); Bt. Nantigo, 1250 m el., BÜNNEMEIJER 3790 (B); Sedarang Agong, 735 m el., RIDLEY l.c.; G. Kerintji, Sumatra Expedition 1877—1878 s.n. (L); 2190 m el., ROBINSON & KLOSS s.n. (S); Bt. Tebakar, 1200 m el., BÜNNEMEIJER 8186 (B, L, S); G. Kerintji, 1550—2900 m el., BÜNNEMEIJER 8794, 9112, 10166, 10414, 10526, 9664, 9202, 9783, 9960, 9986, 9987, 9988 (B); 2500—2800 m el., STOUTJESDIJK 2 (B); 3000 m el., MATTHEW s.n. (K); between Kajoe Aro and the summit, Pondok Boenga, 3000 m el., FREY-WYSSLING 129 (B); Balalau, 900 m el., FORBES 1952 (L); G. Kaba, 1500 m el., DE VOOGD 506 (B); G. Dempo, 1400 m el., AJOEB (exp. JACOBSON) 439 (B); 2220 m el., FORBES 2402 (BD, L); G. Raja, 1000—1643 m el., VAN STEENIS 3566 (B); Bengkoeloe, Liwa, 900 m el., DE VOOGD 41 (B); G. Tanggamaes, 2000 m el., LIEFTINCK 22 (B).

BORNEO. Mt. Kinabalu, CLEMENS s.n. (B); Lobang, CLEMENS 10330 (B); Silau Basin, 1650 m el., CLEMENS 29725 (B); Colombon River basin, 1200 m el., CLEMENS 34031 (B); Penibukan, under Dahobang falls, 1200 m el., CLEMENS 30682 (B).

JAVA. Without exact locality: BLUME s.n. (L, U); ZIPPÉLIUS s.n. (L); KORTHALS 202 & s.n. (L); JUNGHUEN s.n. (L); WAITZ s.n. (L), v.n.: *dawn katepan*; JAGOR s.n. (BD); HILLEBRAND s.n. (BD); „Harriang” VAN HASSELT 54 (L); „Gondang Banteng” WICHURA 2137 (BD); G. Karang, above Pandeglang, 600 m el., BACKER 7379 (B, L); Nirmala, s.w. of Buitenzorg, ravine of the Tjikaniki, 1100 m el., BACKER 10872 (B); Tjiapoos, HALLIER s.n. (B, L); G. Pangrango, HASSKARL 131 (B), original of *Sanicula javanica* BLUME; „Tjicoppo” on G. Gedé nr. Poentjak, BOERLAGE s.n. (L); Tjibodas, 1400—1500 m el., SCHEFFER s.n. (B, L); DE MONCHY s.n. (B, L) HALLIER 72 (L, B), 438 (B); KOORDERS 31679 β (B); VOLKENS 178 (BD); PULLE 4030 (U); VAN HARREVELD s.n. (G); BURKILL 8156 (S); SAPEI 448 (S); DANSER 5720 (G); VAN STEENIS 1851 (B); Tjibeureum, 1650 m el., WICHURA 2136 (BD); between Tjibeureum & Kandang Badak, WARBURG 3124 (BD); below Kandang Badak, 2000—2400 m el., DANSER 6145 (G); 2400 m el., KOORDERS 31800 β (B); REYNVAAN 45 (B); 2400—

2700 m, BACKER 31295 (B); crater Pangrango, 3000 m, REYNVAAN 193 (B); summit, 3060 m el., VAN HASSELT 534 (L); POSTHUMUS 157 (B); G. Gedé, eastern slope, 1420 m, BACKER 3208 (B); 2400 m, BACKER 3252 (B); southern slope, 1800 m el., BACKER 14715 (B); Geger Bintang, 1600 m el., DEN BERGER 596 (B); Sindanglaja, PLOEM s.n. (B); HULLET s.n. (S); Tjireunghas, nr. Soekaboemi, 900—1000 m el., BACKER 14939 (B); forest Takokak, 1000 m el., KOORDERS 15057 β (B), v.n.: *kundje*; 15244 β (B), v.n.: *tespong*; Tjadasmalang nr. Tjibeber, 1000 m el., BACKER 22374 (B); BAKHUIZEN VAN DEN BRINK 1867, 2138, 2056 (B), 2421 (B, L), v.n.: *tetesongan*; G. Malang, s. of Tjireunghas, 1000 m el., BACKER 31916 (B); G. Boerangrang, n. slope, 900 m, BACKER 14124 (B); Wanajasa, s. of Poerwakarta, BAKHUIZEN VAN DEN BRINK 4661 (B, L); Pasir Limoes, 1000 m el., BAKHUIZEN VAN DEN BRINK 4359 (B, L); G. Tangkoebanprahoe, s. slope, 1600 m el., BACKER 2421 (B); 1800 m el., BACKER 30895 (B); Lembang, VAN WELSEN 22 (B); G. Semboeng, s.w. of Bandoeng, 1300 m el., BACKER 12205 (B); Kendeng nr. Bandoeng, DOCTERS VAN LEEUWEN s.n. (B); Rawa Tjangkoan, SCHEFFER s.n. (B), v.n.: *antan*; G. Malabar, WARBURG 11242 (BD); 1800 m el., FORBES 820 (B); 1800—2100 m el., JAGOR 379 (BD); 2300 m el., VAN SLOOTEN 299 (B); 1400—2000 m el., DENKER 79 (B); Tjinjiroean, 2000 m el., KEUCHENIUS s.n. (B); RANT s.n. (B); Pengalengan, 600 m el., FORBES 1020 (BD, L, S); between Tjikakoeripan & G. Patocha, WARBURG 3123 (BD); estate Soekahati, 1200 m el., LEEFMANS s.n. (B); G. Patocha, 2000 m el., LÖRZING 1343 (B, L, S); G. Wajang, between Soemadra & Taloen, 1250 m el., BACKER 5640 (B); G. Papandajan, KORTHALS s.n. (L); Tegal Pandjang, 2041 m el., VAN STEENIS 4337 (B); crater margin, 2450 m el., VAN DER PIJL 465 (B); above the ravine of the Tjiparoegpoeg, 2500 m el., VAN STEENIS 4129 (B); G. Telagabodas, BURCK 532 (B, L); BOERLAGE s.n. (L); 1300—1600 m el., KOENS 282, 253 (B); nr. pasanggrahan Pangentjongan, 1400—1600 m el., KOORDERS 26530 β , 40561 β (B); above Pangentjongan, 1500 m el., BACKER 31917 (B, L); G. Djaja, 1470 m el., LAM 161 (B); G. Tjikoera, SCHEFFER D60 (B), v.n.: *doelang sontog*; above Waspada, 1700 m el., BACKER 5335 (B); G. Galoenggoeng, above Sigaparna, 800 m el., BACKER 8624 (B, L); G. Mandala-giri, Pamegatan, VAN RIJCKEVORSEL 47 (B); Noesa Gedé, in the Pendjaloe Lake, 720 m el., KOORDERS 47887 β (B); G. Goentoer, 1300—2000 m el., KOENS 367 (B); G. Tjerimai, ZIPPELIUS s.n. (L); BLUME s.n. (B, L); N.E. slope, 700 m el., BACKER 4819 (B, L); Petoengkriana, s. of Pekalongan, 1500 m el., BACKER 15906 (B, BD, L); G. Tjedana nr. Madjenang, 700 m el., BACKER 18658 (B); G. Slamet, above Batoe Raden, 700—800 m el., BACKER 178 (B, L), v.n.: *gletang warak*; 1800 m el., LAM 2122 (B); 2150—2440 m el., BACKER 436 (B); 2500 m el., BACKER 514 (B); forest Pringamba, KOORDERS 27125 β (B); 37466 β (B), v.n.: *kepotong*; Diëng, JUNGHUHN s.n. (L); HILLEBRAND s.n. (BD); WARBURG 4390 (BD); plateau, 2000 m el., BACKER 21601 (B); G. Prahoe Diëng, JUNGHUHN s.n. (L); 2000 m el., LÖRZING 317 (B); Wanasaba, 800 m el., BRINKMAN 268 (B); Garoeng nr. Wanasaba, 1100—1600 m el., BACKER 21976 (B); G. Pangonan, 2150 m el., VAN SLOOTEN 366 (B); Diëng-wétan, 2000 m el., WIRJOSAPOETRO 70 (L), v.n.: *pontjoboemi*; G. Soendara, 2500 m el., DOCTERS VAN LEEUWEN 8964 (B); G. Soembing, 2100 m el., LÖRZING 38 (B, BD), v.n.: *tjakar ajam, pulatjeng*; G. Oengaran, JUNGHUHN s.n. (U); 1000 m el., DOCTERS VAN LEEUWEN s.n. (B); nr. Medini, 900—1200 m el., JUNGHUHN s.n. (L), v.n.: *traseng*; WAITZ s.n. (L); slope Soerolaja, 700 m el., DE VISSER SMITS s.n. (B); G. Telamaja, KOORDERS 28050 β (B), v.n.: *oerek polo*; 1400 m el., KOORDERS 35976 β

(B); G. Merbaboe, e. slope, JUNGHUHN s.n. (L); 1900 m el., DE BEYER 93 (B), v.n.: *sledren*; above Salatiga, 2000—2400 m el., BACKER 30264 (B); G. Merapi, 1200 m el., JUNGHUHN s.n. (L); nr. Andong, 900 m el., JUNGHUHN s.n. (L); G. Plampangan, at foot of G. Merapi, 750 m el., BEUMÉE A120 (B); Wanasari, 1000 m el., MOUSSET 59 (L); G. Lawoc, above Djagaraga, 850 m el., BACKER 6729 (B, L); 1000 m el., BLOKHUIS s.n. (B); Sido Ramping, Gandong valley, 1300—1400 m el., ELBERT 301 (L); G. Wilis, 1200 m el., LÖRZING 819 (B); nr. pasanggrahan Ngebel, 1300—1400 m el., KOORDERS 23276 β (B), v.n.: *seledren*; 1600 m el., DEN BERGER 702 (B); above Kediri, 1700—1800 m el., BACKER 11590 (B); G. Pitjis, KOORDERS 29477 β (B); G. Ardjoena, Prigen, RANT s.n. (B); Trètès, 800 m el., BREMEKAMP s.n. (B); 2400 m el., ZOLLINGER 1915 (B, BD, S); G. Kawi, 1500 m el., WISSE 259 (B); Oro-oro plain, spring Sebaloe, 2690 m el., ARENS & WURTH s.n. (B); Tjamara Kandang, 2700 m el., DOCTERS VAN LEEUWEN 12274 (B); G. Tengger, Lawang, MOUSSET 59 (B); Poesoengsadjimah, s. of Malang, 850—1150 m el., VAN OOSTEN 13 (B); 1500—1800 m el., ZOLLINGER 1747 (BD, L); dèsa Ngepoe, 1100—1600 m el., VAN HARREVELD-LAKO 24, 65 (B); Nangkadjadjar, 1200 m el., WISSE 654 (B); 1230 m el., BUYSMAN 3009 (U); Klètak, 1800 m el., DOCTERS VAN LEEUWEN 4540 (B); Ngadisari, 2200 m el., KOORDERS l.e.; G. Kembang, 2300 m el., KOORDERS 37887 β (B, L), v.n.: *toembaran idjoe*; 2500 m el., BACKER s.n. (B); G. Seméroe, above Kaliglidik, 1300 m el., BACKER 3593 (B); G. Widadarèn, 1750 m el., BACKER 3610 (B, L); G. Argapoera, 800 m el., BACKER 13191 (G); G. Ijang, 1900 m el., CLASON G39 (B, G); Tjamaralantjang, 2100 m el., BACKER 9761 (B, L); G. Koe-koesan, 2000 m el., JESWIET 479 (B); Ijang, on the plateau, 2100 m el., KOORDERS 43463 β (B); Kajoemas, OTTOLANDER 356 (B, L), v.n.: *slerem, gali*; G. Idjen, 1200 m el., BACKER 25364 (B); Pantjoer Idjen, 1450 m el., KOORDERS 32561 β (B); Gendingwaloe, 1450 m el., KOORDERS 43162 β (B); Kalibendo, 800 m el., KOORDERS 43163 β (B); G. Raoeng, Soemberwringin, 1250 m el., CLASON 130 (B, G).

TIMOR. Goenoeng Moetis, 2000 m el., DE VOOGD 2299 (B).

SELEBES. Telock Manipi, WARBURG 16131 (BD); G. Bantaeng, EVERETT 33 (S); Rante Lemo, 1400 m el., KJELLBERG 1541 (B).

SERAN. Hatoemete Pass, 500—700 m el., KORNASSI 620 (B).

Distribution: temperate and tropical parts of Europe, Africa, and Asia.

V. ERYNGIUM

LINN., Sp. pl., ed. 1 (1753) 1, p. 232; Gen. pl., ed. 5 (1754) p. 108; BENTHAM, Fl. austr., 3 (1866) p. 369; BENTH. & HOOK.F., Gen. pl., 1, p. 878 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 669 (1879); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 614; DRUDE, in ENGL. & Pr., Nat. Pflanzenfam., III, 8, p. 139; WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 61 (1913) p. 106; THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 974 (1925).

Only species:

1. *Eryngium foetidum* LINN., — Herb, 15—60 cm high. Main root fusiformous. Stem many times di-mono-chasially branched with spreading

branches, nearly glabrous, grooved. Leaves nearly all of them in a rosette, lanceolate-spathulate, 3—32 cm long, 1—4 cm broad, obtuse, sessile with more or less narrowed sheathy base and dentate margin, the teeth crowned by a stinging hair, glabrous. Bracts of the inflorescence palmatilobate to -partite, 1—6 cm long, with spiny apices and teeth, strongly nerved, the lowermost often more like normal leaves. Heads 5—10 mm long, cylindrical, on 1—10 mm long peduncles; involueral bracts 5—7 in number, spreading, nearly lanceolate, with few spiny teeth. Flowers sessile in the axils of narrow, membranous-margined, 1.25—1.5 mm long bracts. Calyx teeth distinct, nearly 0.75 mm long, lanceolate, acute, with narrow membranous margin; petals 0.5—0.75 mm long, nearly 0.25 mm broad, the inflexed tip excluded. Fruit with very indistinct ribs, densely warty, glabrous; mericarps 1—1.5 mm long, 0.5—0.75 mm broad.

Eryngium foetidum LINN., Sp. pl., ed. 1 (1753) 1, p. 232; D. C., Prodr., 4 (1830) p. 94; TEYSMANN & BINNENDIJK, Cat. Pl. Hort. Bot. Bogor. (1866) p. 165; EDELING, in Nat. Tijdschr. Ned. Ind., 31, p. 294 (1870); HIERN, in Fl. Trop. Afr., 3 (1871) p. 6; BOERLAGE, in Handel. Tweede Nat. & Geneesk. Congres (1889) p. 3; Handl. Fl. Ned. Ind., I, 2 (1890) p. 615; KUNTZE, Rev. gen. pl., 1 (1891) p. 267; WIGMAN, in Teysmannia, 4, p. 391, 392 (1893); MASSART, in Mém. Soc. Roy. Bot. Belg., 34, p. 181, 195, 329 (1895); DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 142 (1898); KOORDERS, in Nat. Tijdschr. Ned. Ind., 60, p. 394 (1901); KING, Mat. Fl. Mal. Pen., 13 (1902) p. 599; BACKER, in Ann. Jard. Bot. Buitenz., suppl. 3, 1 (1910) p. 402; KOORDERS-SCHUM., Syst. Verz., I, 1, fam. 228, p. 98 (1911); KOORDERS, Exkursionsfl. Java, 2 (1912) p. 724; WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 61 (1913) p. 203; BOLDINGH, Zakfl. landbouwstr. Java (1916) p. 174; HEYNE, Nutt. pl. Ned. Ind., ed. 1, 3 (1917) p. 396; RIDLEY, Fl. Mal. Pen., 1 (1922) p. 870; KOORDERS, Fl. Tjibod., 2, p. 233 (1923); CHERMEZON, in LECOMTE, Fl. Indo-Ch., 2, p. 1140 (1923); BACKER & VAN SLOOTEN, Handb. Jav. Theekonkr. (1924) p. 186, cum ic.; OCHSE, Trop. groenten (1925) p. 189, cum ic.; HEYNE, Nutt. pl. Ned. Ind., ed. 2 (1927) 2, p. 1211; DAKKUS, in Bull. Jard. Bot. Buitenz., sér. III, suppl. 1 (1930) p. 131; OCHSE & BAKHUIZEN, Ind. groenten (1931) p. 710, ic. 431; CRAIB, Fl. siam. enum., 1, p. 788 (1931); ALSTON, in TRIMEN, Handb. Fl. Ceyl., 6 (1931) p. 138; BACKER, Fl. Jav. Suikerrietgr., p. 475 (1931); BURKILL, Diet. Econ. Prod. Mal. Pen., 1 (1935) p. 944.

Eryngium foetidum has been introduced from Tropical America as a weed, but is entirely naturalized now in the Malay Peninsula, Sumatra, and Java. The oldest specimens seen from the Malay Peninsula have

been collected in Negri Sembilan in 1888, in Penang in 1889, in Pulau Butong in 1890, in Johore in 1894. The oldest ones from Java have been collected near Buitenzorg in 1893, near Takokak in 1894, near Ngebel in 1896, near Pringamba in 1897, on the Goenoeng Telamaja in 1897, near Sepakoeng in 1899. The oldest ones from Sumatra have been collected in 1915 near Mocaradoea, and near Sibolangit in 1917.

From botanical literature we see that the species was observed as early as 1869 near Bidaratjina by EDELING (l.c.). KUNTZE (l.c.) mentions it as seen by him near Buitenzorg in 1875, BOERLAGE (l.c.) found it near Palaboehanratoe in 1888.

MALAY PENINSULA. Penang, CURTIS s.n. (S); nr. Chinese house, Batu Itam, CURTIS s.n. (S); Ginting...? BURKILL 3051 (S); Pulau Boetong, CURTIS s.n. (S), v.n.: *kangkong kerbau*; Perak, Kuala Kendrong, GRIK, BURKILL & HANIFF 12446 (S); Selangor, Ginting Sempak, ILAMID 10259 (S), v.n.: *jeraju gunung*; HUME 8965 (S); Negri Sembilan, Bukit Tumiang, ALVINS 1612 (S), v.n.: *pokô kulumbar*; Pahang, Raub Track, MACHADO 11544 (S); Malacca, CANTLEY'S COLL., s.n. (S); Johore, Tanjong Kupang, RIDLEY s.n. (S); Singapore, Chan Chu Kang, RIDLEY s.n. (S); Bajau, RIDLEY s.n. (S); Kandang Kerbau, RIDLEY 10411 (S).

SUMATRA. Sibolangit, Botanic Garden, 500 m el., LÖRZING 5263 (B, L, U); G. Kerintji, Bt. Tebakar, 850 m el., BÜNNEMEIJER 7956 (B, L, S), v.n.: *oemboe palembang*; Moea'ra Doea, 600 m el., GRASHOFF 530 (B), v.n.: *ketoembor djawa*.

JAVA. Without exact locality: HILLEBRAND s.n. (BD); Bantam, Pasaoeran, 30 m el., BACKER 7265 (B); Rangkasbitong, 50 m el., BACKER 1074 (B), v.n.: *walang*; between Tjitorek & Moentjang, 400 m el., BACKER 1830 (B); between Tjilèlès & G. Kentjana, 200 m el., BACKER 1190 (B); between Bajah & G. Madoer, 25 m el., BACKER 1664 (B, L), v.n.: *walang*; Sadjira, 150—200 m el., BACKER 2039 (B); between G. Kentjana & G. Kendeng, 300 m el., BACKER 1289 (B); between Malingping & Pengawoengan, 5—25 m el., BACKER 1466 (B, L); Batavia, Tjempakapoetih, 5 m el., BACKER 32138 (B, L); G. Sahari, Sentiong, 5 m el., BACKER 32130 (B, L); Kerendang, 5 m el., BACKER 32135 (B); between Batavia & Meester Cornelis, 15 m el., BACKER 32137 (B); near Bidaratjina, anno 1869, EDELING l.c., first record; Tjigombong, 600 m el., KEUCHENIUS s.n. (B); Tjigombong, nr. Buitenzorg, 500 m el., VAN STEENIS 57 (B); between Djasinga & Pasir Madang, 100—500 m el., BACKER 10336 (B, L); Nirmala, 900 m el., BACKER 11116 (B, L, U); Tjidoedjoeng, n. of Buitenzorg, 150 m el., BACKER 22712 (B); between Buitenzorg & Batoetoelis, HALLIER 130a (B, L); Tjiomas, 250 m el., SOEGANDIREDDJA 98 (B, L), v.n.: *walang*; G. Batoe nr. Tjianten, s. of Leuwiliang, 1000 m el., BACKER 25760 (B); Pasir Karèt nr. Buitenzorg, 800 m el., BACKER 32134 (B); Bondongan, HALLIER 130d (B); Buitenzorg, 250 m el., BOERLAGE s.n. (L); HALLIER 130b, 130c (B); KOORDERS 32613 β (B), v.n.: *walang*; AXEL PREYER s.n. (BD), v.n.: *rumpul walang*; WARBURG 11429 (BD); DANSER 5361, 6883 (G); G. Parang, 500 m el., BACKER 13943 (B); between Poerwakarta & Wanajasa, 300—650 m el., BACKER 14391 (B); Tjibadak, 380 m el., BACKER 592 (B); Paroengkoeda, 500 m el., A. M. DE VRIES 8 (B); between Soekaboemi & Njalindoeng, 500—700 m el., BACKER 14546 (B); G. Malang, s. of Tjireunghas, 1000 m el., BACKER 32132 (B); Leuwimanggoe, s. of Tjibeber, 1000 m el., SIKAJA

s.n. (B), v.n.: *katjoentjar walanda*; Tjidadap, s. of Tjibeber, 1000 m el., WINCKEL 11463 (B), v.n.: *katoentjar walanda, walang kendi*; BAKHUIZEN VAN DEN BRINK 4389 (B, L), v.n.: *katoentjar blanda, balang katoentjar, walang katoentjar, katoentjar walang, walang andjing, walang, walang geni, singadepa*; Tjiandjoer, 500 m el., BACKER 3090 (B, L); Kiara Pajoeng, 500—600 m el., ZWAARDEMAKER 105, v.n.: *walang* (B); 550—700 m el., BACKER 23629 (B); Takokak, 1000 m el., KOORDERS 15269 β (B), v.n.: *katoentjar walanda*; KOORDERS 15135 β (B), v.n.: *kapocntjar*; G. Gedé above Tjiandjoer, 800 m el., BACKER 21569 (B); Tjibodas, 1200 m el., KOORDERS 31918 β (B), v.n.: *walang langit*; G. Tangkoebanprahoe, below Lèmbang, 1000 m el., BACKER 32136 (B); Dago, 800 m el., KOORDERS 44301 β (B); Togagapoe, w. of Bandoeng, 650 m el., LÖRZING 1111 (B, L), v.n.: *walang*; Tjilebak on the Tjitaroem, 660 m el., WISSE 905 (B); Palaboehanratoe, BOERLAGE s.n. (L), v.n.: *katoentjar walanda*; Bodjong Lopang, 500—600 m el., BACKER 16924 (B, L); Lengkong, 600 m el., BACKER 17073 (B), v.n.: *katoentjar, katoentjar walanda*; Pasawahan, 400 m el., BACKER 2224 (B); Tjiratjap, 25—100 m el., BACKER 17380 (B); Djampang Koelon, Tjitjoeroeg, 300 m el., BACKER 17230 (B); between Taloen & Tjinjiroean, 1600 m el., BACKER 5719 (B); G. Goentoer, s. slope, 1500—2000 m el., KOENS 105 (B); Tjisoeroepan nr. Garoet, 1200 m el., KOENS 493 (B); between Garoet & Tjipanas, 750 m el., BACKER 5169 (B); between Soekaradja & Singaparna, 350 m el., BACKER 8470 (B), v.n.: *walang*; G. Mandalagiri, 1350 m el., VAN VUUREN s.n. (B), v.n.: *walang*; bivouac Denoe, on the Tji Patoedjah, 300 m el., BACKER 9042 (B); Noesagedé in the Pendjaloe Lake, 720 m el., KOORDERS 47888 β (B); Tjiamis, 350 m el., BARENS s.n. (B), v.n.: *walang*; Bantardawa nr. Bandjar, 50 m el., BACKER 32131 (B); Rawah Lakbok, s. Tjikawoeng, 20 m el., BACKER 4294 (B); between Tjerebon & Koeningan, 340—500 m el., BACKER 4768 (B); Tegal, forestry Margasari, 90 m el., NOLTÉE 2590 (B); Petoengkriana, 900 m el., BACKER 15960 (B); between Slawi & Balapoelang, 50—100 m el., BACKER 15364 (B, L); between Dara & Petoengkriana, 300 m el., BACKER 15726 (B); Dara, 100 m el., BACKER 15615 (B); Madjenang, 30—100 m el., BACKER 18428 bis (B); G. Slamet, Kalibakoeng, 360 m el., HAGEDOORN & JESWIET s.n. (B); G. Slamet, above Batoe Raden, 700—800 m el., BACKER 160 (B); Wadas Poempang nr. Patikradja, 200 m el., BEUMÉE 4809 (B); Poerwokerto 75 m el., BACKER 6 (B); 300 m el., BACKER 116 (B), v.n.: *moengsi*; Karanganjar, KOORDERS 26231 β (B), v.n.: *toembaran oenga*; Bandjarnegara, between Pringamba & Desa Sawal, KOORDERS 27118 β (B), v.n.: *djinten*; between Wanasaba & Garoeng, 800—1100 m el., BACKER 21989 (B); Temanggoeng, 600 m el., LÖRZING 350 (B, BD), v.n.: *toembaran, ketoembar landa*; Magelang, 380 m el., VAN OOSTEN 19 (B); Daroepana, 100 m el., BACKER 16447 (B); Oengaran, Garoeng, 1200 m el., DOCTERS VAN LEEUWEN s.n. (B); G. Telamaja, KOORDERS 28011 β (B), v.n.: *toembaran*; Sepakoeng, 1000 m el., KOORDERS 35917 β (B), v.n.: *ketoel kebo*; Salatiga, DOCTERS VAN LEEUWEN s.n. (B); G. Kidoel, between Djepitoe & Kalak, 200 m el., BACKER 2841 (B), v.n.: *djintenan*; G. Lawoe nr. Girimoeljo, 600 m el., BACKER 6790 (B); G. Willis, w. slope, 250 m el., WISSE s.n. (B), v.n.: *djintenan*; Ngebel, 900 m el., KOORDERS 23252 β (B), v.n.: *toembaran*; between Toelahan & Tegalombo, 500 m el., BACKER 2920 (B); between Sripit & Prigi, 150 m el., LÖRZING 1004 (B); Prigi, 8 m el., LÖRZING 1047 (B); Modjokerto, Dampak nr. Segoenceng, 700 m el., WINCKEL s.n. (B); Poenten, 1100 m el., HOFSTEE 14 (B); Malang, 450 m el., WISSE 242 (B); Djember, 83 m el., ULTÉE 3 (B); 100 m el., BACKER 17719 (B, L).

Distribution: indigenous in tropical America, introduced in few parts of Tropical Africa and Asia.

VI. CHAEREFOLIUM

HALLER, Hist. Stirp. Helv., 1 (1768) p. 327; THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1014 (1926); *Anthriscus* PERSOON, Synops., 1 (1805) p. 320; BENTHAM & HOOKER FIL., Gen. pl., 1, p. 899 (1867); CLARKE, in HOOK. F., Fl. Br. Ind., 2, p. 692 (1879); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 619; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 152 (1898).

Only species:

1. *Chaerefolium Cerefolium* (LINN.) SCHINZ & THELLUNG — Herb, somewhat hirsute. Stems 25—50 cm high, striate and grooved. Petioles of the lower leaves up to 7 cm long, with sheathy base, upper leaves with shorter petioles or sessile on the sheaths; laminae of the lower leaves triangular in outline, 4—11 cm long, 3—15 cm broad, bi- to tripennate, the primary leaflets ovate, obtuse, with 0.5—2.5 cm long petiolules, the secondary leaflets ovate, pennatipartite, with obtuse apices. Inflorescence a di-monochasium of sessile compound umbels; involucre none; involucels with 3—4 bracts nearly 2 mm long, 0.75 mm broad, lanceolate, acute, with narrow membranous margin; rays of the main umbel 3—5 in number, 5—25 mm long; pedicels 4—9 in number, 2—4 mm long, when flower-bearing, up to 5 mm long when fruit-bearing. Petals white, nearly 1—1.5 mm long, 0.5—1 mm broad, obcordate, with short inflexed tips. Mericarps 5—6 mm long, up to 1 mm broad, sometimes hirsute with antrorse hairs when unripe, black and finely granular when ripe, grooved at the inside, bearing a beak up to 2.5 mm long and nearly 0.5 mm broad; stylopodium flat. (Description after European materials.)

Scandix Cerefolium LINN., Sp. pl., ed. 1 (1753) p. 257; *Anthriscus Cerefolium* HOFFMANN, Gen. Pl. Umbellif. (1814) p. 41; D. C., Prodr., 4 (1830) p. 223; MIQUEL, Fl. Ind. Bat., I, 1, p. 744 (1856); BISSCHOP GREVELINK, Pl. Ned. Ind. (1883) p. 212; BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 619; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 152 (1898); KOORDERS, Exkursionsfl. Java, 2 (1912) p. 725; *Chaerefolium Cerefolium* SCHINZ & THELLUNG, in Vierteljahrsschr. Naturf. Gesellsch. Zürich, 53, p. 554 (1909); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1027, ic. 2384 (1926).

Java, cultivated according to MIQUEL, BOERLAGE, KOORDERS ll. cc.; no specimens seen.

Distribution: indigenous in S.E. Europe and W. Asia (THELLUNG, l.c.), cultivated and subspontaneous in all parts of the world.

VII. TORILIS

ADANSON, *Fam. pl.*, 2 (1763) p. 99; MIQUEL, *Fl. Ind. Bat.*, I, 1, p. 743 (1856); BENTHAM & HOOK.F., *Gen. pl.*, 1, p. 928 (1867); BOERLAGE, *Handl. Fl. Ned. Ind.*, I, 2 (1890) p. 625; DRUDE, in ENGL. & PR., *Nat. Pflanzenfam.*, III, 8, p. 155 (1898); THELLUNG, in HEGI, *Ill. Fl. Mitteleur.*, V, 2, p. 1048 (1926).

Only species:

1. *Torilis japonica* (HOULTUYN) D. C. — Annual or perennial herb. Stem to more than 1 m high, finely striate, rough by appressed bristles. Leaves triangular in outline, acuminate, sparingly appressedly hirsute, pennate with leaflets pinnatipartite, the segments pinnatifid to serrate. Inflorescences terminal and axillary; peduncle 5—20 cm long; involucre 2—6-leaved; involucels with 3—7 nearly filiformous bracts; umbel-rays 0.5—3 cm long, 4—12 in number, antrorsely hirsute; pedicels 4—10 in each umbellule, 1—4 mm long, hirsute like the peduncle. Calyx teeth distinct, nearly 0.5 mm long, triangular-lanceolate, mucronulate; petals 0.5—1 mm long and broad, obcordate with inflexed tip, appressedly hairy outside. Mericarps about 4 mm long, 1.5 mm broad, oblong, with obtuse ribs, and with densely placed uncinat bristles in the grooves between the ribs. (Description after the materials under mentioned.)

Tordylium Anthriscus LINN., *Sp. pl.*, ed. 1 (1753) 1, p. 240; *Caucalis Anthriscus* HUDSON, *Fl. angl.*, ed. 1 (1762) p. 99; D. DON, *Prodr. fl. nep.* (1825) p. 183; CLARKE, in HOOK. FIL., *Fl. Br. Ind.*, 2, p. 718 (1879); KUNTZE, *Rev. gen. pl.*, 1 (1891) p. 266; *Caucalis japonica* HOULTUYN, *Nat. Hist.*, II, 8 (1777) p. 42, t. 45, 1; *Torilis Anthriscus* (non GAERTN. 1788) GMELIN, *Fl. bad.*, 1 (1806) p. 615; D. C., *Prodr.*, 4 (1830) p. 218; WIGHT & ARN., *Prodr.* (1834) p. 374; MIQUEL, *Fl. Ind. Bat.*, suppl. Sum. (1860) p. 134, 336; TEYSMANN & BINNEND., *Cat. pl. Hort. Bot. Bogor.* (1866) p. 166; FILET, *Plantk. Woordenb.* (1876) p. 13; BOERLAGE, *Handl. Fl. Ned. Ind.*, I, 2 (1890) p. 625; DRUDE, in ENGL. & PR., *Nat. Pflanzenfam.*, III, 8, p. 156, ic. 58L—N (1898); MATSUMURA & HAYATA, *Enum. pl. Formos.* (1906) p. 174; KOORDERS-SCHUM., *Syst. Verz.*, I, 1, fam. 228, p. 98 (1911); KOORDERS, *Exkursionsfl. Java*, 2 (1912) p. 725; HAYATA, *Ic. pl. Formos.*, 2, p. 57 (1912); BOLDINGH, *Zakfl. Landbouwstr. Java* (1916) p. 175; CHERMEZON, in LEC., *Fl. Indo-Ch.*, 2, p. 1157 (1923); RIDLEY, in *Journ. Mal. Br. Roy. As. Soc.*, 1, p. 63 (1923); THELLUNG,

in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1051, ie. 2315a, 2393—2395, t. 193. 3 (1926); RANT, in Nat. Tijdschr. Ned. Ind., 89, p. 451 (1929); VAN STEENIS, in Bull. Jard. Bot. Buitenz., sér. III, 13, p. 256 (1934); *Torilis japonica* D. C., Prodr., 4 (1830) p. 219; *Torilis scabra* (non D. C., 1830) ZOLLINGER, Syst. Verz. Ind. Arch. 1842—1848 (1854) p. 139; MIQUEL, Fl. Ind. Bat., I, 1, p. 744 (1856); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 625; KOORDERS, in Teysmannia, 11, p. 244 (1901); in Nat. Tijdschr. Ned. Ind., 60, p. 371 (1901).

According to THELLUNG (l.c.) *Torilis japonica* is indigenous in Europe, N. Africa, and temperate Asia, but introduced in S. Asia and America. In the latter countries it is said to have been introduced with clover-seed. Also VAN STEENIS (l.c.) considers *T. japonica* as an alien in Sumatra and Java.

According to CLARKE (l.c.) this species occurs in the Himalaya from 900 to 2700 m elevation. As so many other Himalaya plants also occur in the mountains of Sumatra and Java, it looks quite possible to consider *T. japonica*, too, as a species spread from the Himalaya southward along the mountain ridges of the islands mentioned, in a quite natural way, be it with help of man or not.

The plants from Java and Sumatra appear to agree entirely with the European form.

SUMATRA. Karo Plateau, Berastagi, 1300—1350 m el., LÖRZING 5919 (B, L), 6716 (B); Dolok Singgalang, N. of Lake Toba, 1450 m el., LÖRZING 8844 (B); nr. Raja, 1300 m el., LÖRZING 4904 (B); nr. Lingga, 1225 m el., LÖRZING 6269 (B, L); Nagasariboe, HAGEN s.n. (B); Sumatra's Westkust, Lolo, TEYSMANN 1609 H.B. (B, U), v.n.: *ambo-ambo*.

JAVA. G. Tengger, ZOLLINGER 2515 (BD); way to the Sand-sea, RANT s.n. (B); Ngadisari, KOORDERS s.n. (L); between Tosari & Ngadiwono, 1700—1800 m el., MOUSSET 705 (B); Tosari, 1800—2500 m el., KOBUS s.n. (B); 2000 m el., BACKER 8358 bis (B); near Klêtak, DOCTERS VAN LEEUWEN 4566 (B); Ider-Ider, KOBUS 258 (B); Widadarèn, Kedenen, 2400 m el., KOORDERS 37888 β (B, L), v.n.: *toembaran alas*.

Distribution: see the discussion above.

VIII. CORIANDRUM

LINN., Sp. pl., ed. 1 (1753) 1, p. 256; Gen. pl., ed. 5 (1754) p. 124; BENTHAM & HOOK.F., Gen. pl., 1, p. 926 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 717 (1879); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 622; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 158 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1071 (1926).

Only species:

1. **Coriandrum sativum** LINN. — Annual herb, entirely glabrous. Stems terete, striate, up to 75 cm high. Laminae of the lower leaves palmatilobate to -partite, those of the middle leaves pennate, with segments gradually narrower, obtuse, those of the upper leaves pennate to bipennate with segments 0.5 mm broad. Inflorescences terminal or seemingly lateral; peduncle 2–10 cm long; involucre none or reduced to one leaf up to 5 mm long; involucels with 3–5 bracts, that are linear up to 5 mm long by 0.5 mm broad; umbel rays 3–5 in number, 1–2.5 cm long; pedicels 3–5 in each umbellule, 3–5 mm long. Calyx teeth triangular-lanceolate to oblong-lanceolate, somewhat radiating, the outer ones nearly 1 mm long, the inner ones shorter. Petals radiating, the outer ones of the inflorescence 3–4 mm long, the other ones shorter, all of them deeply bipartite with inflexed apex. Mericarps 4 mm long, 2 mm broad, hollow at the inside, together forming a nearly globose fruit; primary ribs not prominent, visible as undulated lines, secondary ribs somewhat prominent, filiformous. (Description after all the plants under mentioned.)

Coriandrum sativum LINN., Sp. pl., ed. 1 (1753) 1, p. 256; D.C., Prodr., 4 (1830) p. 250; HASSKARL, Cat. Pl. Hort. Bot. Bogor. (1844) p. 164; MOLKENBOER, in MIQUEL, Pl. Junghuhn., p. 98 (1851); ZOLLINGER, Syst. Verz. Ind. Arch. 1842–1848 (1854) p. 139; MIQUEL, Fl. Ind. Bat., I, 1, p. 744 (1856); TEYSMANN & BINNEND., Cat. Pl. Hort. Bot. Bogor. (1866) p. 166; BENTHAM, Fl. Austr., 3 (1866) p. 336; MIQUEL, Ill. Fl. Arch. Ind. (1871) p. 43; HIERN, in Fl. Trop. Afr., 3 (1871) p. 3; FILET, Plantk. Woordenb. (1876) p. 159; CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 717 (1879); BISSCHOP GREVELINK, Pl. Ned. Ind. (1883) p. 213; BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 622; MASSART, in Mém. Soc. Roy. Bot. Belg., 34, p. 203, 327 (1895); DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 159, ic. 43D, 59A–D (1898); KOORDERS, Versl. Dienstr. Minah. (1898) p. 488; DE CLERCQ, Plantk. Woordenb. (1909) p. 210; KOORDERS-SCHUM., Syst. Verz., I, 1, fam. 228, p. 98 (1911); KOORDERS, Exkursionsfl. Java, 2 (1912) p. 725; WIGMAN, in VAN GORKUM, O. Ind. Cult., 2, p. 882 (1913); VAN DONGEN, Overz. Geneesm. Ned. Ind. (1913) p. 130; BOLDINGH, Zakfl. Landbouwstr. Java (1916) p. 174; HEYNE, Nutt. Pl. Ned. Ind., ed. 1, 3 (1917) p. 396; RIDLEY, in Journ. F. M. S. Mus., 8, 4 (1917) p. 42; CHERMEZON, in LEC., Fl. Indo-Ch., 2, p. 1156 (1923); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1071, ic. 2312f–g, 2316c, 2319a, 2321d–e, t. 194, 2 (1926); HEYNE, Nutt. Pl. Ned. Ind., ed. 2, 2 (1927) p. 1212; DAKKUS, in Bull. Jard. Bot. Buitenz., sér. 3, suppl. 1 (1930) p. 82; OCHSE & BAKH., Ind. Groenten (1931)

p. 703, ic. 427; CRAIB, Fl. siam. enum., 1, p. 793 (1931); BURKILL, Diet. Econ. Prod. Mal. Pen., 1 (1935) p. 633.

SUMATRA. Atjèh, Gajo Locëus, Panampakan, PRINGGO ATMODOJO (exp. VAN DAALLEN) 334 (B, L); Doerèn, PRINGGO ATMODOJO (exp. VAN DAALLEN) 343 (B, L); Palèmbang, Moearadoca, 650 m el., GRASHOFF 541 (B), v.n.: *ketoembor*; Sandaran Agong, 735 m el., RIDLEY l.c.; G. Pakiwang, N.W. of Danau Rana, 500 m el., VAN STEENIS 3770 (B).

JAVA. Without exact locality: ZOLLINGER 2757 (BD); Batavia, cultivated, SMITH s.n. (B, L), v.n.: *wansoei*; Ragoenan nr. Pasir Minggoe, OCHSE s.n. (B, S, U); between Batavia & Meester Cornelis, BACKER 34390 (B), cultivated; Buitenzorg, nr. veterinary school, BACKER 34391 (B); G. Gedé, e. slope, 1300 m el., BACKER 3180 (B); from Tjipatjèt nr. Sindanglaja, bought on the pasar at Buitenzorg, BAKHUIZEN VAN DEN BRINK 7412 (B), v.n.: *katoentjar*; Sindanglaja, 1075 m el., subsontaneous in a garden, BACKER 22793 (B, L, S); Lèmbang, cultivated, VAN WELSEME s.n. (B); Batoe, above Malang, 850 m el., ULTÉE 88 (B); Ngadisari, 2000—2200 m el., KOORDERS 38093β (B), 37878 β (B, L), v.n.: *ketoembar*.

SELEBES. Tondano, FORSTEN s.n. (L).

Distribution: indigenous from Mediterranean region to Central Asia, cultivated and subsontaneous in nearly all parts of the world. (THELLUNG, l.c.)

IX. OREOMYRRHIS

ENDLICHER, Gen. pl., p. 787 (1839); HOOKER FIL., Fl. Nov. Zel., 1 (1853) p. 92; Handb. New. Zeal. Fl. (1864) p. 90; BENTHAM, Fl. austr., 3 (1866) p. 377; BENTHAM & HOOKER, Gen. pl., 1, p. 897 (1867); DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8 (1898) p. 163; CHEESEMAN, Man. N. Zeal. Fl. (1906) p. 205.

The genus *Oreomyrrhis* is spread in the mountains of Central and South America from Mexico to the Falkland Islands and moreover in those of Australia and New Zealand. The polymorphic *O. andicola* HOOKER F. covers the whole area of the genus, the other species are more local.

In the area dealt with in this paper 4 *Oreomyrrhis* forms have been collected. Two of these, from Borneo and New Guinea, have been taken up here as forms of *O. andicola*, two others, both from New Guinea, have been kept separated as distinct species.

Key to the species.

- | | |
|--|-----------------------|
| 1 Leaves not compound, linear to narrowly spatulate . . . | 3. <i>O. linearis</i> |
| Leaves compound | 2 |
| 2 Leaves pennate to bipennate, with the primary leaflets in several pairs . . | |
| | 1. <i>O. andicola</i> |
| Leaves subternate, with the lateral leaflets tripartite, the terminal leaflet ternate with tripartite segments | 2. <i>O. papuana</i> |

1. **Oreomyrrhis andicola** HOOKER FIL. — Perennial herb. Main root fusiformous, bearing a caudex with few erect branches and one or more rosettes. Leaves 0.8—16 cm long; sheath 0.3—3 cm long, 1—3.5 mm broad in the lower portion, gradually tapering into the petiole, membranaceous towards the margin, glabrous or short-hirsute on the back side, short-hirsute or sparingly pilose inside, rather densely ciliate; petiole 0.3—10 cm long, canaliculate, glabrous or short-hirsute; lamina triangular-ovate in outline, 0.5—4 cm long, 0.4—1.6 cm broad, pennate to bipennate with 5—11 primary leaflets of which the lower ones sometimes (in large leaves) pennate again with 3—5 secondary leaflets, usually all leaflets pennatifid to pennatipartite with lanceolate 1—2.5 mm long, 0.25—0.5 mm broad, thin coriaceous, glabrous or shortly hirsute, sometimes finely ciliate, sometimes mucronulate segments and with sometimes recurved margin, the small leaflets only dentate with acute, 0.75—1 mm long, nearly 0.25 mm broad triangular teeth. Inflorescences simple umbels, one to several in each rosette (terminal or lateral?); peduncles 0.7—8 cm long, terete, densely hairy with spreading somewhat silky hairs or shortly hirsute towards the apex, sometimes glabrescent; pedicels 1—9 in each umbel, 0—0.5 mm long, sometimes growing out to 3 mm long when fruit-bearing; involucre with 5—10 bracts, that are ovate-lanceolate with broad base, 2—4 mm long, densely sericeous or shortly hirsute outside, sometimes finely ciliate. Calyx teeth none; petals broad-elliptic-ovate, nearly 1 mm long, shortly ciliate at the base or glabrous, white or sometimes reddish. Fruit nearly 2.5—3.5 mm long, oblong-ovate, somewhat incurved, 0.75—1.5 mm thick, 0.75—1.25 mm broad, with prominent ribs, densely short-hirsute or glabrous; stylopodium conical, nearly 0.5 mm high, 0.4 mm thick at the base, with 2 recurved obtuse tips; carpophore split down to the base, sometimes hirsute at the margins. (Description after the materials under mentioned.)

Myrrhis andicola KUNTH, in HUMB. & BONPL., Nov. gen. et sp., 5, p. 13, t. 419 (1821); *Caldasia andicola* D. C., Mém. Ombell., p. 60 (1829); Prodr., 4, p. 229 (1830); *Oreomyrrhis andicola* HOOKER FIL., Fl. antarct., 2, p. 288, t. 101 (1844—47) n.v.; BENTHAM, Fl. austr., 3 (1866) p. 377; *Oreomyrrhis Colensoi* HOOKER FIL., Fl. Nov. Zel., 1 (1853—55) p. 92, n.v.; Handb. N. Zeal. Fl., p. 91 (1864), p. 729 (1867); *Oreomyrrhis Haastii* HOOKER FIL., Handb. N. Zeal. Fl., p. 91 (1864); *Oreomyrrhis borneënsis* MERRILL, in Amer. Journ. Bot., 5, p. 515, ic. 36 (1918); Bibl. Enum. Born. Pl. (1921) p. 459; VAN STEENIS, in Bull. Jard. Bot. Buitenzorg, sér. III, 13, p. 255 (1934); *Oreomyrrhis pumila* RIDLEY, in Trans-

act. Linn. Soc., ser. II, bot., 9, p. 63 (1916); VAN STEENIS, in Bull. Jard. Bot. Buitenzorg, sér. III, 13, p. 255 (1934).

According to MERRILL l. c. the Borneo plant, described by him as *Oreomyrrhis borneënsis*, „approaches distinctly a New Zealand form from Awatere, distributed by H. A. Travers as *Oreomyrrhis andicola* Endl. forma *tenuifolia*. It differs radically from this form, however, in its very long petioles; in its peduncles being shorter than the petioles, the New Zealand form having the peduncles longer than the leaves; in its very short pedicels and its cinereous-hirsute, not glabrous fruit.” From the materials of *O. andicola*, examined by me in the Kew Herbarium, appears that none of the distinctive characters enumerated by MERRILL for his *O. borneënsis* can be hold upright. There is a New Zealand form of *O. andicola*, described by HOOKER as *O. Colensoi*, entirely agreeing with *O. borneënsis*, with exception of the length of the pedicels and the indumentum of the fruit, and also in the Andes there occur forms (e. g. SPRUCE 5797) that have the peduncles shorter than the leaves and the petioles longer than the lamina. The other organs, on the characters of which are based *O. borneënsis*, are so variable in *O. andicola*, that the former cannot be separated from the latter as a species. Hirsute fruit are found in specimens distributed by TRAVERS, s.n., from New Zealand, South Island, Mt. Torlesse, 900 and 1050 m el., moreover in the form described by HOOKER as *O. Haastii*, and in specimens from Bolivia and Tasmania that are entirely white-tomentose; but between tomentose and glabrous plants there are found all intermediates. Sessile or short-pedicelled fruit are found in the form described by HOOKER as *O. Haastii*. For all these reasons I must consider *O. borneënsis* as a form of *O. andicola*.

The plant described by RIDLEY as *O. pumila*, from New Guinea, I must consider as a dwarf form of *O. andicola*. It is 1.5—5 cm high, the leaves agree in shape with that of the Borneo plant, but are smaller and less deeply divided, whereas the pedicels grow out when fruit-bearing, and the fruit are glabrous.

As already remarked, *O. andicola* is very polymorphic. It is glabrous to white-tomentose. Its height varies from 1.5—50 cm. The rosettes are dense or loose and from them arise simple umbels or slightly branched stems with few leaves and several umbels, arranged again nearly in an umbel. The leaves are bi-tri-pennate, rarely simply pennate with pennately divided leaflets; their petiole is shorter or longer than the lamina.

BORNEO. Mt. Kinabalu, CLEMENS s.n. (B); among shrubs near the top at Donkey's Ears and foot of Victoria Peak, 3700—3900 m el., CLEMENS 29809 (B);

Paka Cave to Low's Peak, 4000 m el., in two crevices near the summit, CLEMENS 10622 (B, cotype of *Oreomyrrhis borneensis* MERRILL); in crevices of ledges near the summit of Low's Peak, TOPPING 1687 (K).

NEW GUINEA. Wollaston Expedition, camps XIII—XIV, 3150—3750 m el., KLOSS s.n. (BM, type of *Oreomyrrhis pumila* RIDLEY).

2. *Oreomyrrhis papuana* BUWALDA, n. sp. — Fig. 5. — Herba, probabiliter perennis. Radix primaria fusiformis, caudice simplici vel ramis nonnullis erectis rosulas ferentibus. Folia ad 18 cm longa; vagina 1—4 cm longa, parte inferiore ad 5 mm lata, sensim in petiolum attenuata, margine vix membranacea, omnis glabra; petiolus 4—12 cm longus, canaliculatus, subglaber, prope laminam setis paucis subhirsutus; lamina circuitu rhomboideo-ovata, 1.5—2.5 cm longa, 8—20 mm lata, subternata, foliolo terminali ternato segmentis tripartitis, foliolis lateralibus tripartitis, segmentis omnibus lanceolato-cuneatis, crasse coriacea, margine crasso et nervorum facie inferiore setis antrorsis. Inflorescentiae umbellae simplices singulae; pedunculus 12—33 mm longus, teres, leviter sulcatus, c. 1 mm crassus, parte inferiore subglaber vel setulis minimis retrorsis scabriusculus, apicem versus setis retrorsis appressis dense vestitus, scaber; involucreum compositum e bracteis 6—9 oblongo-spathulatis, basi latis, 5—8 mm longis, 1—2 mm latis, textura et indumento ut in foliorum laciniis, primum erectis, postea reflexis; pedicelli 15—30, tempore florendi brevissimi, postea excrecentes, exteriores ad 5 mm longi, interiores breviores, setulis brevibus retrorsis appressis scabri. Calycis dentes nulli; petala 1—1.25 mm longa, c. 0.75 mm lata, oblongo-ovata vel oblongo-obovata; filamenta c. 0.5 mm longa, antherae c. 0.25 mm longae, 0.2 mm latae; styli c. 0.25 mm longi. Fructus ovato-oblongus, 4—6 mm longus, c. 0.75 mm latus, 1.25 mm crassus; mericarpia jugis 5 prominentibus obtusis, intus sulcata, glaberrima; stylopodium biconicum, basi bis 0.25 mm latum, 0.6 mm altum, apicibus 2 conicis obtusis paulum excurvatis; carpophorum

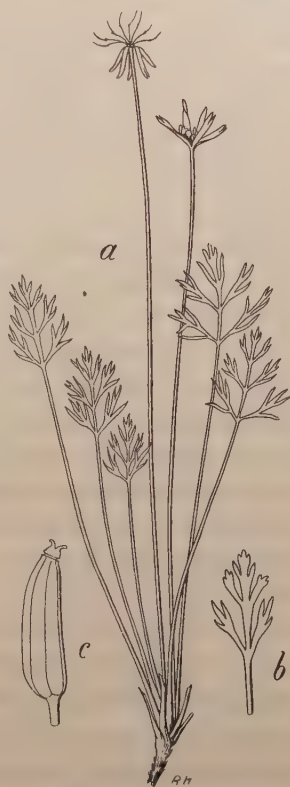


Fig. 5. — *Oreomyrrhis papuana*; a: plant, after LAM 1674, $\frac{2}{3} \times$; b: leaf, after LAM 1694, $\frac{2}{3} \times$; c: fruit, after LAM 1674, $4 \times$.

integrum subulatum glaberrimum. (Description after the materials mentioned. In the remnants of fruit-bearing inflorescences of the last vegetation period, the carpophores are sometimes split at the tip and moreover appear hirsute, probably by a fungus.)

Oreomyrrhis papuana BUWALDA, ex VAN STEENIS, in Bull. Jard. Bot. Buitenzorg, sér. III, 13, p. 255 (1934) nomen.

Oreomyrrhis papuana is closely related to *O. andicola*, and the only differences are those in the leaf shape, mentioned in the determination key. As the leaf shape is extremely variable in *O. andicola*, it seems questionable whether *O. papuana* is not one of the forms of *O. andicola*. Among the materials of the Kew Herbarium I did not succeed, however, in finding any form showing a leaf shape similar to that of our new species.

NEW GUINEA. Doorman Top, 3500 m el., in an open swampy ravine near the summit, LAM 1694 (B, type, also alcohol materials), leaves green, petioles sometimes red towards the base, peduncle with green base and with violet hue towards the apex, involucre dark green, pedicels green, corolla dark violet, calyx green, somewhat violet, filaments violet, anthers brownish green, slightly violet, ovary green; foot of Doorman top, 3200 m el., LAM 1674 (B, alcohol materials only).

3. *Oreomyrrhis linearis* HEMSLEY — Perennial herb, cespitose. Roots probably numerous, 1—3 mm thick above, with fibrous branches. Caudex with numerous erect branches, very variable in length, up to 12 cm long, beset with fibrous leaf rudiments, bearing dense or lax rosettes at the extremities. Leaves 2—20 cm long, always with distinct sheath and petiole, with or without broader lamina; sheath 5—35 mm long, 1—4.5 mm broad, with a 0.5 mm broad yellowish margin, tapering into the petiole; petiole difficultly to be distinguished from the lamina, together with the latter forming a narrowly spatulate to entirely linear whole, the petiole 0.75—1 mm broad, if distinguishable, 0.5—7 cm long, the lamina as broad as the petiole or up to 5 mm broad below the dentate apical portion, in narrow leaves with one tooth on each side close to the apex, in broader leaves with 2—4 teeth on each side that are 1—4 mm long, up to 2 mm broad, the largest ones often with a lateral tooth; leaf margin thickened, in narrow leaves moreover revolute, usually finely retrorsely ciliate; upper and lower surface usually glabrous or the upper surface retrorsely appressedly hirsute; nervation pennate with strongly ascending lateral nerves in broader leaves, hardly visible above; main nerve and thickest lateral nerves strongly prominent beneath, finer nerves slightly prominent or indistinct. Peduncles one or several in each rosette, 6—30 cm long, erect or somewhat curved, leafless or rarely with one leaf, triangular with somewhat thickened angles, retrorsely hir-

sute towards the apex with appressed whitish bristles up to 0.5 mm long, often entirely glabrous later; involueral braets 5—6 in number, lingulate, obtuse, 2—5 mm long, 0.5—1.25 mm broad, connate at the base, glabrous towards the apex, retrorsely hirsute towards the base; flowers 6—8 in each umbel, pedicels of the outer flowers to 1.5 mm long, the inner flowers sessile, lengthening later; fruit-bearing pedicels 2.5—10 mm long, densely retrorsely hirsute. Ovary nearly 1.75 mm long, 0.75 mm broad; calyx teeth none; petals triangular, 1.1—1.2 mm long, 0.8 mm broad, violet; filaments to 0.7 mm long, violet; anthers nearly 0.4 mm long, 0.25 mm broad, fixed in the middle, opening laterally; styles nearly 0.5 mm long, slightly curved outward. Fruit to 5 mm long, oblong-ovate, slightly curved, attenuate towards the apex, nearly 1 mm broad, 1.5 mm thick, the mericarps with 5 prominent, 0.2 mm high, obtuse ribs, grooved inside, entirely glabrous; stylopodium low-conical, 2-partite; carpophore split down to the base. (Description after the plants collected by BRASS.)

Oreomyrrhis linearis HEMSLEY, in HOOK., Ic. pl., 26, t. 2590 (1899); VAN STEENIS, in Bull. Jard. Bot. Buitenz., sér. III, 13, p. 255 (1934).

Oreomyrrhis linearis was only known, hitherto, from the originals collected by GIULIANETTI and described by HEMSLEY. The rather abundant materials, collected by BRASS, and upon which the above description is based, give a better idea of the polymorphy. There are small specimens (BRASS 4307) of which the caudices are short and crowded, the rosettes very many-leaved and dense, the leaves entirely linear from the sheath upwards, only 2.5—7 cm long, 1 mm broad, the two teeth so closely near the apex that the leaf appears quite entire at first sight, the peduncles nearly twice as long as the leaves. These specimens look like a form of open sunny locality, and indeed the label mentions their growing „amongst summit rocks”. Other specimens (BRASS 4404) are partly like the above described, partly more slender, the leaves to 20 cm long, to 1.5 mm broad below the apical portion, the 3 teeth more distinct, the peduncles less than twice as long as the leaves, now and then even shorter than the leaves; they have been collected on „open grassland”. The number BRASS 4358 has leaves not longer, but broader, to 4.5 mm broad under the apex, the teeth more numerous, to 3 on both sides, and more distinct, the lower ones to 3 mm long and 1.75 mm broad, here and there again bearing a tooth at the outside; these specimens are from „sheltered high mountain grassland”. The number BRASS 4753 is like the preceding, but the plants are longer, the leaves to 18 cm, the peduncles to 30 cm long; it has been collected on „grassy creek banks

on open country". The number BRASS 5682 is one small plant with short but broad leaves, bearing to 4 teeth at each side, that often again bear a tooth; it has been collected on „open grassland". The originals collected by GIULIANETTI are between the numbers BRASS 4404 and 4358.

NEW GUINEA. S.E. part (Papua), Central Division, Mt. Albert Edward, 3680 m el., BRASS 4358 (NY), common, sheltered high mountain grasslands, leaves erect, flowers purple-red; BRASS 4404 (NY), tufted on open grasslands, common, flowers purple-red; BRASS 5682 (NY), open grasslands; 3986 m el., BRASS 4307 (NY), common amongst summit rocks, flowers and fruit purple; Wharton Range, Murray Pass, 2840 m el., BRASS 4753 (NY), common, grassy creek banks on open country; Mount Seratchley, 3000—3900 m el., GIULIANETTI s.n. (K); Wharton Range, 3330 m el., GIULIANETTI s.n. (K).

X. CUMINUM

LINN., Sp. pl., ed. 1 (1753) 1, p. 254; Gen. pl., ed. 5 (1754) p. 121; BENTHAM & HOOKER FIL., Gen. pl., 1, p. 926 (1867); CLARKE, in HOOK. FIL., Fl. Br. Ind., 2, p. 717 (1879); DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 184 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1138 (1926).

Only species:

1. *Cuminum Cyminum* LINN. — Annual herb. Stem 15—50 cm high, erect, strongly branched from the base with divergent branches, terete, striate, entirely glabrous. Leaves short-petioled or sessile upon a sheath to 1 cm long and 0.5 mm broad, with a membranous white margin, auriculate at the apex or tapering into the petiole; lamina 3—10 cm long, bipennate, the segments linear, to 1.5 mm broad. Inflorescences compound umbels opposite to the leaves, or terminal; peduncle 2—4 cm long; involueral bracts 3 to 5 in number, 2—3.5 cm long, tripartite or twice tripartite, with filiformous segments, sessile upon a 0.5 cm long sheath with membranous white margin; umbel rays 4 to 6 in number, 1—1.5 cm long; bracts of the involucels 2 to 4 in number, to 9 mm long, white-membranous at the margin; pedicels 3 to 7 in number, 4—5 mm long. Calyx teeth 1—1.5 mm long, linear to subulate, persistent; petals nearly 1 mm long by 0.5 mm broad, obcordate with inflexed tip. Mericarpia 5—7 mm long, nearly 3 mm broad, somewhat laterally flattened, with 5 filiformous bristly main ribs, and with a stellate-hairy line in the valleculae. (Description after plants from the Orient in the Kew Herbarium.)

Cuminum Cyminum LINN., Sp. pl., ed. 1 (1753) 1, p. 254; D. C., Prodr., 4 (1830) p. 201; ROXBURGH, Fl. Ind., ed. CAREY (1832) 2, p. 92;

WIGHT & ARN., Prodr. (1834) p. 373; HIERN, in Fl. Trop. Afr., 3 (1871) p. 3; ROXBURGH, Fl. ind., ed. 3 (1874) p. 271; FILET, Plantk. Woordenb. (1876) p. 89; CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 718 (1879); BISSCHOP GREVELINK, Pl. Ned. Ind. (1883) p. 211; KOORDERS, Versl. Dienstr. Minah. (1898) p. 488; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 184 (1898); DE CLERCQ, Plantk. Woordenb. (1909) p. 213; KOORDERS, Exkursionsfl. Java, 2 (1912) p. 726; WIGMAN, in VAN GORKUM, O.I. Cultures, 2, p. 883 (1913); VAN DONGEN, Overz. Geneesm. Ned. Ind. (1913) p. 130; HEYNE, Nutt. Pl. Ned. Ind., ed. 1, 3 (1917) p. 397; THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1138, ic. 2424, 2425 (1926); HEYNE, Nutt. Pl. Ned. Ind., ed. 2 (1927) 2, p. 1212; OCHSE & BAKHUIZEN, Ind. groenten (1931) p. 706, ic. 429; BURKILL, Dict. Econ. Prod. Mal. Pen. (1935) 1, p. 701.

JAVA, cultivated according to BISSCHOP GREVELINK, KOORDERS, WIGMAN, HEYNE, OCHSE, ll. cc.

Distribution: indigenous in Turkestan, cultivated in all parts of the world.

XI. APIUM.

LINN., Sp. pl., ed. 1 (1753) 1, p. 264; Gen. pl., ed. 5 (1754) p. 128; BENTHAM, Fl. austr., 3 (1866) p. 371; BENTHAM & HOOK.F., Gen. pl., 1, p. 888 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 678 (1879); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 616; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 184 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1139 (1926); WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 90, p. 26, 358 (1927).

Key to the species.

Leaves pennate, with broad 3-partite to 3-lobate petiolulate leaflets . . .

1. *A. graveolens*

Leaves bi- to tripennate, with very narrow or filiformous segments . . .

2. *A. tenuifolium*

1. *Apium graveolens* LINN. — Annual or biennial herb. Primary root fusiformous or tuberiformous. Stems 25—90 cm high, angular, striate and grooved. Petioles rather long with a white-margined, rather short sheath up to 2 cm long in the lower leaves; lamina pennate with leaflets 2—2.5 cm long up to 3 cm broad, 3-lobate to 3-partite, petiolulate, in the upper leaves smaller, ternate to 3-partite. Compound umbels opposite to the leaves; peduncle 0—2 cm long; rays 10—15 in number, 1—3 cm long; pedicels 6—10 in number, 2—3 mm long; involucre and involucels none. Calyx teeth none; petals white or greenish, 0.5 mm long and broad, with inflexed tip. Mericarps 1 mm long, up to 0.75 mm

broad, with all ribs very narrowly winged; stylopodium nearly 0.25 mm high, the halves conical; carpophore emarginate at the tip.

Apium graveolens LINN., Sp. pl., ed. 1 (1753) 1, p. 264; D. C., Prodr., 4 (1830) p. 101; WIGHT & ARN., Prodr. (1834) p. 367; HASSKARL, Cat. Pl. Hort. Bot. Bogor. (1844) p. 163, cum var. *rapaceo*; MIQUEL, Fl. Ind. Bat., I, 1, p. 737 (1856); TEYSMANN & BINNEND., Cat. Pl. Hort. Bot. Bogor. (1866) p. 165; HIERN, in Fl. Trop. Afr., 3 (1871) p. 11; FILET, Plantk. Woordenb. (1876) p. 305; CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 679 (1879); BISSCHOP GREVELINK, Pl. Ned. Ind. (1883) p. 206; BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 617; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 185, ic. 64, D—E (1898); KOORDERS, Versl. Dienstr. Minah. (1898) p. 488; MATSUMURA & HAYATA, Enum. pl. Formos. (1906) p. 171; DE CLERCQ, Plantk. Woordenb. (1909) p. 170; KOORDERS-SCHUM., Syst. Verz., I, 1, fam. 228, p. 98 (1911); KOORDERS, Exkursionsfl. Java, 2 (1912) p. 726; HAYATA, Ic. pl. Formos., 2 (1912) p. 52; WIGMAN, in VAN GORKUM, O.I. Cultures, 3 (1913) p. 691; HEYNE, Nutt. Pl. Ned. Ind., ed. 1, 3 (1917) p. 397; CHERMEZON, in LECOMTE, Fl. Indo-Ch., 2, p. 1143, ic. 135, 11—13 (1923); OCHSE, Trop. groenten (1925), p. 185 cum ic. p. 186; THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1142, ic. 2426—2428, 2430, i, 2434, g—i, t. 195, 5 (1926); WOLFF, in ENGLER, Pflanzenr., IV, 228, Heft 90, p. 28 (1927); HEYNE, Nutt. Pl. Ned. Ind., ed. 2 (1927) 2, p. 1213; DAKKUS, in Bull. Jard. Bot. Buitenz., sér. 3, suppl. 1 (1930) p. 24; EWART, Fl. Victoria (1930) p. 907; OCHSE & BAKHUIZEN, Ind. groenten (1931) p. 697, ic. 424; CRAIB, Fl. siam. enum., 1, p. 788 (1931); BURKILL, Diction. Econ. Prod. Mal. Pen., 1 (1935) p. 192.

SUMATRA. Cultivated at Berastagi and Pamatang Siantar, brought on the market at Medan and probably also exported to Penang and Singapore (after oral communication by Prof. J. KUYPER, Groningen); sold on the market at Palembang (MIQUEL, Fl. Ind. Bat., suppl. Sumatra, p. 52, 1860).

JAVA. Sold during the whole year by the Sundanese at Buitenzorg, from mountain cultures, now and then even planted in their gardens by the European (after oral communication by Prof. B. H. DANSER, Groningen); cultivated E. of Tjibodas, HEYNING, in Teysmannia, 13, p. 87 (1902); Tjipanas, Tjibodas, Tjimatjan, Tjihandjavar, up to 1500 m el., and even higher, Kandangsapi, Kemang, and other localities between Tjipanas and Tjibodas on G. Gedé, 1000—1400 m el., DE BIE, in Pemimpin Pengoesaha Tanah, I, 9—10, p. 60—67 (1915); Pengalengan, cultivated, WARBURG 3121 (BD); Semarang, from the mountains, MULLER, in Nat. & Geneesk. Arch. Ned. Ind., 2, p. 465 (1845); Diëng Plateau, 2100 m el., cultivated in a native garden, BACKER 21874 (B); Ngadisari, 2000 m el., KOORDERS 38092 β (B), cultivated, v.n.: *seledri*.

Distribution: indigenous in the temperate parts of Europe, Africa, and Asia, also in S. America, cultivated elsewhere (THELLUNG, WOLFF ll. cc.).

2. *Apium tenuifolium* (MOENCH) THELLUNG — Annual herb. Primary root fusiformous. Stems 40—50 cm high, striate, nearly glabrous. Leaves bi- to tri-pennate with nearly filiformous 0.5—1 mm broad segments. Inflorescences opposite to the leaves; peduncle 0—2 cm long; umbel rays 3—5 in number, 0.5—1 cm long; pedicels 5—10 in number, 2—4 cm long; involucre and involucels none. Calyx teeth none; petals white, nearly 0.4—0.6 mm long, 0.2 mm broad the strongly inflexed tip excluded. Mericarps nearly 1.5 mm long, 0.5 mm broad, with obtusely keeled ribs. Stylopodium finally bipartite, the halves small, conical; carpophore bipartite at the apex down to about one-seventh of its length. (Description after the materials under mentioned.)

Sison Ammi (non LINN. 1753) JACQUIN, Hort. Vindob., t. 200 (1773) excl. synonym., ex THELL., in HEGI, l. c.; *Cnidium tenuifolium* MOENCH, Meth. (1794) p. 98, excl. synonym; *Pimpinella leptophylla* PERSOON, Synops., 1 (1805) p. 324; *Helosciadium leptophyllum* D. C., Mem. Soc. Phys. Genève, 4, p. 493 (1828); Prodr., 4 (1830) p. 105; *Apium leptophyllum* BENTHAM, Fl. austr., 3 (1866) p. 372; BAILEY, Queensl. Fl., 2 (1900) p. 724; Compr. Cat. Queensl. Pl. (1913) p. 229; SPRAGUE, in Journ. Bot., 61 (1923) p. 129; ALSTON, in TRIMEN, Handb. Fl. Ceylon, 6 (1931) p. 138; *Apium Ammi* URBAN, in MART., Fl. bras., XI, 1, p. 341, t. 91 (1879); DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 185 (1898); WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 90 (1927) p. 53, 361; EWART, Fl. Victoria (1930) p. 907; *Apium tenuifolium* THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1140 (1926).

MALAY PENINSULA. P. Pinang, Pinang Hill Garden, weed, RIDLEY 10248 (S); Government Hill, 750 m el., CURTIS 3407 (S) introduced; 720 m el., BURKILL 761 (S).

JAVA. Buitenzorg, WARBURG 1688, after WOLFF l. c.; Trètès, after communication by Dr. C. A. BACKER.

NEW GUINEA. WOLFF, l. c.

Distribution: Central & Southern America, Australia, New Zealand, cultivated or adventitious in Europe & Asia (THELLUNG, WOLFF, SPRAGUE, ll. cc.).

XII. PETROSELINUM

HILL, Brit. Herbal (1756) p. 424; HOFFMANN, Gen. pl. Umbellifer. (1814) p. 78, t. I, 7; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 186 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1154 (1926); WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 90 (1927) p. 63; *Carum* sect. *Petroselinum* BENTH. & HOOK.F., Gen. pl., 1, p. 891 (1879).

Only species:

1. *Petroselinum vulgare* HILL — Biennial herb. Stems 25—100 cm high, erect, grooved. Lower leaves to tripennate, with obovate to cuneate tripartite leaflets; upper leaves ternate. Inflorescences terminal and axillary; peduncle 2—12 cm long; umbel rays 5—10 in number, 1—3 cm long; pedicels 3—15 in each umbellule, 2—5 mm long; involucre 1—3-leaved, involucels 3—8-leaved. Calyx teeth none; petals greenish-yellow, nearly 1 mm long, 0.5 mm broad, with inflexed tip. Mericarps 2—2.5 mm long, nearly 1 mm broad, their ribs filiformous. (Description after European and Javan plants.)

Apium Petroselinum LINN., Sp. pl., ed. 1 (1753) 1, p. 264; HOUTTUYN, Nat. Hist., II, 8 (1777) p. 227; BISSCHOP GREVELINK, Pl. Ned. Ind. (1883) p. 206; *Petroselinum vulgare* HILL, Brit. Herbal (1756) p. 424, ic. p. 60; DRUCE, in Rep. Bot. Exch. Club Brit. Isl., 3, p. 439 (1913); OCHSE & BAKHUIZEN, Ind. groenten (1931) p. 717, ic. 435; BURKILL, Diet. Econ. Prod. Mal. Penins. (1935) 1, p. 1699; *Petroselinum hortense* HOFFMANN, Gen. pl. Umbellifer. (1814) p. 163, t. I, 7; THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1155, ic. 2433, 2434, a—f, 2435a—2437, t. 196, 2 (1926); WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 90 (1927) p. 63; *Petroselinum sativum* HOFFMANN, Gen. pl. Umbellifer. (1814) p. 177; D. C., Prodr., 4 (1830) p. 102; HASSKARL, Cat. Pl. Hort. Bot. Bogor. (1844) p. 163; MIQUEL, Fl. Ind. Bat., I, 1, p. 737 (1856); TEYSMANN & BINNEND., Cat. Pl. Hort. Bot. Bogor. (1866) p. 165; BENTHAM, Fl. austr. 3 (1866) p. 336; MASSART, in Mém. Soc. Roy. Bot. Belg., 34, p. 203, 335 (1895); KOORDERS, Versl. Dienstr. Minah. (1898) p. 488; DRUDE, in ENGLER & PRANTL, Nat. Pflanzenfam., III, 8, p. 186 (1898); KOORDERS-SCHUM., Syst. Verz., I, 1, fam. 228, p. 98 (1911); KOORDERS, Exkursionsfl. Java, 2 (1912) p. 726; WIGMAN, in VAN GORKUM, O. Ind. Cult., 3, p. 685 (1913); HEYNE, Nutt. Pl. Ned. Ind., ed. 1, 3 (1917) p. 398; OCHSE, Trop. groenten (1925) p. 191, ic. p. 192; HEYNE, Nutt. Pl. Ned. Ind., ed. 2 (1927) 2, p. 1213; *Carum Petroselinum* BENTH. & HOOK.F., Gen. pl., 1, p. 891 (1867); EWART, Fl. Victoria (1930) p. 906; *Petroselinum Petroselinum* KARSTEN, Fl. Deutschl. 2, p. 394 (1895).

SUMATRA. Cultivated near Berastagi and Pamatang Siantar, brought on the market in Médan (after oral communication by Prof. J. KUYPER, Groningen).

JAVA. Batavia, cultivated, HEYNE s.n. (B, L); Meester Cornelis, 30 m el., cultivated, BACKER 21041 (B); Tjianten, S. of Leuwiliang, nr. Buitenzorg, 900 m el., cultivated, BACKER 25676 (B); Semarang, brought from the mountains (MULLER, in Nat. & Geneesk. Arch., 2, p. 465, 1845); Ngadisari, 2000 m el., KOORDERS 38091 β (B), cultivated, v.n.: *potroseli*.

Distribution: indigenous in South Europe and North Africa, cultivated and spontaneous elsewhere (THELLUNG, WOLFF, ll. cc.).

XIII. TRACHYSPERMUM

LINK, Enum. Hort. Berol., 1 (1821) p. 267; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 188 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1167 (1926); WOLFF, in ENGLER, Pflanzenr., IV, 228, Heft 90, p. 87 (1927); *Carum* sect. *Trachyspermum* BENTH. & HOOK.F., Gen. pl., 1, p. 891 (1867).

Key to the species.

Leaves 2—3-pennatisect, the ultimate segments of the lower leaves to 1 mm broad. Calyx teeth distinct. Fruit with broad, roundish scale-like hairs

1. *T. Ammi*

Leaves 2-pennatisect, ultimate segments of the lower leaves more than 2 mm broad. Calyx teeth obsolete. Fruit with narrow obtuse nipple-shaped hairs

2. *T. Roxburghianum*

1. *Trachyspermum Ammi* (LINN.) SPRAGUE — Annual herb. Stems 25—45 cm high, striate, glabrous, usually strongly branched. Leaves 2—3-pennate, the ultimate segments narrow-oblong, to 1 mm broad. Inflorescences terminal or seemingly lateral; peduncle 1—6.5 cm long; umbel rays 5—9 in number, 0.5—1 cm long, to 2 cm long when fruit-bearing; pedicels 4—15 in number, 1—6 mm long; involucre with 3—5 oblong, sometimes divided bracts, involucels of 4—5 oblong bracts, the bracts of both very unequal in length, hirsute, with membranous margin. Calyx teeth distinct, nearly 0.2 mm long, thickly subulate. Petals 0.6—0.7 mm long and broad, obcordate, with inflexed tip. Fruit to 2 mm long, 1 mm broad, with broad scale-like hairs especially along the ribs. (Description after specimens in the Buitenzorg Herbarium, cultivated by Mr. HEYNE in his garden.)

Sison Ammi LINN., Sp. pl., ed. 1 (1753) p. 252; *Ammi copticum* LINN., Mantissa 1 (1767) p. 56; *Ligusticum ajowan* ROXBURGH, Hort. bengal. (1814) p. 21, nomen; *Ligusticum ajowan* ROXBURGH, Fl. ind., ed. CAREY, 2 (1832) p. 91; ed. 3 (1874) p. 271; *Trachyspermum copticum* LINK, Enum. Hort. Berol., 1 (1821) p. 267; THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1167 (1926); WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 90 (1927) p. 87, 364; *Ptychotis coptica* D. C., in Mém. Soc. Phys. Genève, 4, p. 496 (1828); Prodr., 4 (1830) p. 108; *Ptychotis Ajowan* D. C., in Mém. Soc. Phys. Genève, 4, p. 497 (1828); Prodr., 4 (1830) p. 109; WIGHT & ARN., Prodr. (1834) p. 368; WIGHT, Ic. pl., t. 566 (1843); MIQUEL, Fl. Ind. Bat., I, 1, p. 737 (1856); *Carum copticum* HIERN, in Fl. Trop. Afr., 3 (1871) p. 12; CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 682 (1879) excl. syn.; BOERLAGE, Handl. Fl. Ned. Ind., I, 2

(1890) p. 618; TREUB, in *Teysmannia*, 10, p. 73, 74 (1900); VAN DONGEN, *Overz. geneesm. Ned. Ind.* (1913) p. 129; HEYNE, *Nutt. pl. Ned. Ind.*, ed. 1, 3 (1917) p. 398; MERRILL, *Interpr. Rumph. Herb. Amb.* (1917) p. 411; *Enum. Phil. Fl. Pl.*, 3, p. 238 (1923); HEYNE, *Nutt. pl. Ned. Ind.*, ed. 2 (1927) 2, p. 1214; *Trachyspermum Ammi* SPRAGUE, in *Kew. Bull.* (1929) p. 228; BURKILL, *Diction. Econ. Prod. Mal. Pen.*, 2, p. 2171 (1935).

JAVA, formerly cultivated, according to HEYNE l.c.

Distribution: indigenous and cultivated in Egypt, Abyssinia, S.W. Asia to E. India, subspontaneous in Europe (THELLUNG, WOLFF, ll. cc.).

2. *Trachyspermum Roxburghianum* (D. C.) CRAIB — Annual herb.

Stems 15—90 cm high, striate, nearly glabrous, usually strongly branched. Leaves pennate with the leaflets pennatifid to pennatipartite, the extreme segments of the lower leaves to 3 mm broad, those of the upper leaves gradually narrower, those of the uppermost leaves very narrow, sometimes nearly filiformous. Inflorescences terminal and axillary; peduncle 2—8 cm long, rays 2—6 in number, 1—2.5 cm long; pedicels 5—15 in each umbellule, 2—6 mm long; involucre 2—5-leaved, involucels 5—8-leaved, both with very narrow and finely ciliate bracts. Calyx teeth indistinct, hardly 0.1 mm long; petals nearly 1.25 mm long, 0.75 mm broad, obovate with inflexed tip. Mericarps oblong, nearly 2.5 mm long, 0.75 mm broad, whole fruit with very short obtuse spreading hairs. (Description after the materials under mentioned.)

Apium involucreatum ROXBURGH, ex FLEM., *Ind. Med. Pl.*, in *As. Research*, 11, p. 157 (1810); WIGHT, *lc. pl.*, II, t. 567 (1843); *Ptychotis Roxburghiana* D. C., *Prodr.*, 4 (1830) p. 109; MIQUEL, *Fl. Ind. Bat.*, I, 1, p. 737 (1856); *Ptychotis involucreata* ROYLE, *Ill. bot. Himal.*, 1, p. 229 (1839); *Carum Roxburghianum* KURZ, in *Journ. As. Soc. Beng.*, 46, II, p. 114 (1877); CLARKE, in *HOOK.F.*, *Fl. Br. Ind.*, 2, p. 682 (1879); BOERLAGE, *Handl. Fl. Ned. Ind.*, I, 2 (1890) p. 618; HEYNE, *Nutt. Pl. Ned. Ind.*, ed. 1, 3, p. 399 (1917); CHERMEZON, in *LEC.*, *Fl. Indo-Ch.*, 2, p. 1144, *lc.* 135, 14—16 (1923); HEYNE, *Nutt. Pl. Ned. Ind.*, ed. 2 (1927) 2, p. 1214; DAKKUS, in *Bull. Jard. Bot. Buitenz.*, sér. III, suppl. 1 (1930) p. 59; *Carum involucreatum* MERRILL, *Enum. Phil. Fl. Pl.*, 3, p. 239 (1923); OCHSE & BAKH., *Ind. groenten* (1931) p. 700, *lc.* 425; *Trachyspermum involucreatum* (non MAIRE 1922) WOLFF, in *ENGL.*, *Pflanzenr.*, IV, 228, Heft 90 (1927) p. 89; *Trachyspermum Roxburghianum* WOLFF, in *ENGL.*, *Pflanzenr.*, IV, 228, Heft 90 (1927) p. 129, *errore*; CRAIB, *Fl. siam. enum.*, 1, p. 788 (1931); BURKILL, *Diction. Econ. Prod. Mal. Pen.*, 2, p. 2172 (1935).

MALAY PENINSULA. Selangor, CANTLEY's coll. s.n. (S); Singapore, MIQUEL, l. c.

SUMATRA. Atjeh, Kong Boer, Gajoloeëus, PRINGGO ATMODOJO (exp. VAN DAALEN) 199 (B, L), v.n.: *renggiroeng*; Sibolangit, 500 m el., LÖNZING 4216 (B), supspontaneous; G. Kerintji, Sumatra Expedition 1877—1878 (B); N. foot of G. Pakiawang, 500 m el., W. side Danau Rana, VAN STEENIS 3836 (B), cultivated in ladang; Mocaradoea, 250 m el., GRASHOFF 395, 446 (B, L), v.n.: *adas*, *djintoa*.

JAVA. Batavia, E. of Loeloet, 400 m el., VAN SLOOTEN 600 (B); Buitenzorg, 250 m el., BAKHUIZEN VAN DEN BRINK 6801 (B, L, S, U) cultivated, v.n.: *soeragè*; Kalapanoenggal, nr. Buitenzorg, HEYNE s.n. (B, BD, L, S, U) cultivated; Tjileungsi and Kalapanoenggal, ex HEYNE l. c.; Si Boentoe nr. Kalapanoenggal, 200—300 m el., BACKER 5842 (B, L), cultivated, v.n.: *soeragè*; Tjibaroesa nr. Buitenzorg, VORDERMAN s.n. (B) cultivated; Tjiterep nr. Buitenzorg, ARSIN s.n. (B, L); Boerangrang, Wana-jasa, 650 m el., BACKER 14239 (B), cultivated, v.n.: *parmesèli*; Tegal, 5 m el., BACKER 15447 (B) cultivated, v.n.: *pitersili*, *pletikapoe*; Bandjarnegara, 270 m el., BACKER 22042 (B) cultivated; Djogjakarta, JUNGHUHN s.n. (L), cultivated; Madioen, 60 m el., WISSE 64 (B); Pasoeroean, 4 m el., BACKER 24166 (B, L) and BACKER s.n. (Pa), cultivated; Bandawasa, 250 m el., BACKER 9495 (B).

MADOERA. Ketapangdaja, 1 m el., BACKER 19822 (B), cultivated, v.n.: *terseli*; Pamekasan, 15 m el., BACKER 20289 (B), v.n.: *perséli*.

LETI, nr. Timor. TREUB 466 (B, L).

HALMAHERA. Galèla, 10 m el., BEGUIN 1781 (B, L), v.n.: *sorowai*.

BATJAN. WARBURG 18114 (BD).

SERAN. Sannoeloe, sea level, KORNASSI 640 (B, L, U).

NEW GUINEA. Merauke, VERSTEEG 1847 (B).

Distribution: of unknown provenance, now cultivated and subsponaneous in tropical S.E. Asia (WOLFF l. c.).

XIV. CRYPTOTAENIA

D. C., Mém. Ombellif. (1829) p. 42; Prodr., 4 (1830) p. 118; BENTH. & HOOK.F., Gen. pl., 1, p. 896 (1867); DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 189, 271 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1169 (1926); WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 90 (1927) p. 111.

Only species:

1. *Cryptotaenia canadensis* (LINN.) D. C. — Perennial herb. Rhizome 1—2 cm long, up to 1 cm thick, chambered. Stems erect, up to 90 cm high, terete, striate. Lower petioles up to 10 cm long, the upper ones gradually shorter, sheaths auriculate at the apex and with membranous margin; lamina ternate, with sessile or short-petiolulate ovate to rhomboidal irregularly biserrate to bidentate leaflets, the lateral ones often bifid to bipartite. Compound umbels terminal on the stems and the branches, united into leafy panicles; peduncles 1—8 cm long; rays 5—7 in number, 3—50 cm long, those of one umbel very different in

length; pedicels of each umbellule 6—10 in number, 1.5—15 mm long, those of one umbellule very different in length; involucre none or with one or two 4 mm long subulate leaves; involucels with 2—5 to 1 mm long subulate leaves. Calyx none during flowering, short on the fruit. Petals white, nearly 1 mm long, 0.5—0.75 mm broad, obovate with inflexed apex. Mericarps 4—6 mm long, 1.5 mm broad, oblong-ellipsoidal, attenuate towards both ends, somewhat laterally compressed, distinctly ribbed; stylopodium coniformous, bipartite, the halves together with the styles forming nearly 0.75 mm long beaks on the mericarps. (Description after specimens cultivated in the Buitenzorg and Groningen Botanic Gardens.)

Sison canadense LINN., Sp. pl., ed. 1 (1753) 1, p. 252; *Cryptotaenia canadensis* D. C., Prodr., 4 (1830) p. 119; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 189 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1169, ic. 2442 (1926); WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 90 (1927) p. 111; DAKKUS, in Bull. Jard. Bot. Buitenz., sér. III, suppl. 1 (1930) p. 87; OCHSE & BAKHUIZEN, Ind. groenten (1931) p. 705, ic. 428; *Cryptotaenia japonica* HASSKARL, Retzia, 1, p. 113 (1855); TEYSMANN & BINNEND., Cat. Pl. Hort. Bot. Bogor. (1866) p. 166.

JAVA. Cultivated by the Japanese according to OCHSE and BAKHUIZEN l.c.

Distribution: indigenous in eastern N. America, China and Japan (THELLUNG and WOLFF, ll. cc.).

XV. CARUM

LINN., Sp. pl., ed. 1 (1753) 1, p. 263; Gen. pl., ed. 5 (1754) p. 127; BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 617, p.p.; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 191 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1181 (1926); WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 90 (1927) p. 143; *Carum* sect. *Carvi* BENTH. & HOOK.F., Gen. pl., 1, p. 890 (1867).

Only species:

1. **Carum Carvi** LINN. — Biennial herb. Stems to 55 cm high, erect, terete, striate. Lower petioles to 13 cm long, upper ones gradually shorter, uppermost ones none, all of them with a sheath with membranous margin and auriculate apex; lamina oblong, to 13 cm long 5 cm broad, bipennate with divided segments. Compound umbels terminal to the stems and the branches; peduncles 1—11 cm long; involucre none or of one subulate leaf; involucels none; rays 5—8 in number, 0.5—2 cm long; pedicels 1.5—5 mm when flower-bearing, up to 9 mm when fruit-bearing, 6—14 in each umbellule. Calyx teeth none; petals white or

reddish, to 1.25 mm long, nearly 1 mm broad, obovate with short inflexed tip. Mericarps 4—5 mm long, up to 1 mm broad, often falcate, with distinct yellowish ribs. Stylopodium bipartite, the halves low-conical. (Description after European materials.)

Carum Carvi LINN., Sp. pl., ed. 1 (1753) 1, p. 263; D. C., Prodr., 4 (1830) p. 115; MIQUEL, Fl. Ind. Bat., I, 1, p. 737 (1856); HIERN, in Fl. Trop. Afr., 3 (1871) p. 12; FILET, Plantk. Woordenb. (1876) p. 89; CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 680 (1879); BISSCHOP (GREVELINK, Pl. Ned. Ind. (1883) p. 206; BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 618; KOORDERS, Versl. Dienstr. Minah. (1898) p. 488; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 192 (1898); DE CLERCQ, Plantk. Woordenb. (1909) p. 195; KOORDERS, Exkursiönsfl. Java, 2 (1912) p. 726; VAN DONGEN, Overz. Geneesm. Ned. Ind. (1913) p. 129; THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1182, ic. 2448—2449, t. 197, 1a—c (1926); WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 90 (1927) p. 145; BURKILL, Diction. Econ. Prod. Mal. Penins. (1935) 1, p. 468.

JAVA. Cultivated, according to MIQUEL and KOORDERS, l.c.; cultivated near Tosari after oral communication by Prof. J. KUYPER, Groningen.

Distribution: indigenous in Europe and temperate Asia, cultivated elsewhere. (THELLUNG, WOLFF, l.c.).

XVI. PIMPINELLA

LINN., Sp. pl., ed. 1 (1753) 1, p. 263; Gen. pl., ed. 5 (1754) p. 128; BENTH. & HOOK.F., Gen. pl., 1, p. 893 (1867); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 618; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 195 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1196 (1926); WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 90 (1927) p. 219; *Murrithia* & *Heterachaena* ZOLLINGER, in Nat. & Geneesk. Arch. Ned. Ind., 2, p. 576, 577 (1845); *Anisometros* HASSKARL, in Flora, 30, p. 602 (1847).

Key to the species.

- 1 Fruit densely warty. Involucre 3- to more-leaved. Lower leaves usually imparipennate 3. *P. pruatjan*
- Fruit hairy. Involucre 1—2-leaved. Lower leaves mostly simple. 2
- 2 Lower and middle leaves simple, with serrate margin, not lobed. Umbel rays 20—30 2. *P. javana*
- Lower leaves orbicular to reniformous, often crenate, sometimes lobate, middle leaves ternate to pennate with incised leaflets. Umbel rays 8—14

1. *P. Anisum*

1. *Pimpinella Anisum* LINN. — Annual herb. Stems erect, terete, grooved, pubescent. Lower leaves with petioles 4—10 cm long, upper ones with petioles gradually shorter, uppermost ones sessile, all with mem-

branous-margined sheath; lower laminae crenate to cordate, serrate, the following ones successively incised, ternate and nearly pennate with dentate to incised leaflets. Compound umbels terminal to the stem and its branches; peduncles 2.5—7 cm long; involucre none or of 2 narrow 3—4 mm long leaves; rays 8—14 in number, 4—25 mm long; pedicels 7—13 in each umbellule, 1—5 mm long; involucels none or of 1 or 2 subulate 1 mm long leaves. Calyx teeth indistinct; petals nearly 1 mm long, obcordate with inflexed tip. Mericarps up to 5 mm long, 2 mm broad, ellipsoidal, attenuate towards the apex, short-hairy with antrorse hairs and distinct ribs. Stylopodium bipartite, conical. (Description after European materials.)

Pimpinella Anisum LINN., Sp. pl., ed. 1 (1753) 1, p. 264; HOUTTUYN, Nat. Hist., II, 8 (1777) p. 224; D. C., Prodr., 4 (1830) p. 122; MIQUEL, Fl. Ind. Bat., I, 1, p. 740 (1856); FILET, Plantk. Woordenb. (1876) p. 1; BISSCHOP GREVELINK, Pl. Ned. Ind. (1883) p. 208; BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 619; DRUDE, in ENGLER & PR., Nat. Pflanzenfam., III, 8, p. 196 (1898); KOORDERS, Versl. Dienstr. Minah. (1898) p. 488; DE CLERCQ, Plantk. Woordenb. (1909) p. 304; KOORDERS, Exkursionsfl. Java, 2 (1912) p. 727; VAN DONGEN, Overz. Geneesm. Ned. Ind. (1913) p. 130; WIGMAN, in VAN GORKUM, O. Ind. Cult., 2 (1913) p. 883; THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1209, ic. 2310a, 2456 (1926); WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 90 (1927) p. 232, 374; EWART, Fl. Victoria (1930) p. 908; BURKILL Diction. Econ. Prod. Mal. Pen., 2, p. 1728 (1935).

JAVA, sometimes cultivated, according to MIQUEL, KOORDERS, WIGMAN, ll. cc.

Distribution: from unknown provenance, probably from the Orient, cultivated and subspontaneous throughout the world, especially in the Mediterranean Region and in Central Europe (THELLUNG, and WOLFF, ll. cc.).

2. *Pimpinella javana* D. C. — Perennial herb. Stems erect or adscendent, usually 50—150 cm high, terete, striate, shortly and densely hairy, almost tomentose in the youth, glabrescent later. Lower leaves nearly in a rosette, with a petiole to 10 cm long of which the lower 3—6 cm sheathy, the lamina entire, ovate in outline, deeply cordate, to 12 cm long by 10 cm broad, subobtusely to acutely serrate; upper leaves gradually smaller and shorter-petioled, more acutely serrate or even dentate, the uppermost ones bearing branches in their axils, often tripartite, all of them more or less hairy above, white-tomentose below in the youth, glabrescent later. Compound umbels united to an oblong panicle, distinctly terminal to the stem and the branches or seemingly opposite the leaves; peduncles 4—15 cm long; rays 20—30 in number,

2—4 cm long; pedicels 12—16 in each umbel, 3—8 mm long; involucre 0—4-leaved, involucels 1—4-leaved, with bracts nearly filiformous and shorter than the outer pedicels. Calyx teeth none; petals nearly 1.5 mm long by 1 mm broad, with small inflexed tip. Mericarps nearly 2 mm long, 1 mm broad, densely hairy with short spreading hairs. (Description after the materials under mentioned.)

Pimpinella javana D. C., Prodr., 4 (1830) p. 122; MOLKENBOER, in MIQUEL, Pl. Junghuhn., p. 96 (1851) cum var.s *macrophylla*, *sylvestri*, *microphylla*; MIQUEL, Fl. Ind. Bat., I, 1, p. 738, t. 10 (1856) cum var.s *macrophylla*, *sylvestri*, *microphylla*; Ill. Fl. Arch. Ind. (1871) p. 40; FILET, Plantk. Woordenb. (1876) p. 94; BECCARI, Malesia, 1 (1877) p. 219; in Bot. Jahrb., 1, p. 29 (1881); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 618; KUNTZE, Rev. gen. pl., 1 (1891) p. 269; WIGMAN, in Teysmannia, 4, p. 740 (1893); KOORDERS, in Nat. Tijdschr. Ned. Ind., 60, p. 371 (1901); in Teysmannia, 11, p. 246 (1901); DE CLERCQ, Plantk. Woordenb. (1909) p. 304; KOORDERS-SCHUM., Syst. Verz., I, 1, fam. 228, p. 99 (1911); KOORDERS, Exkursionsfl. Java, 2 (1912) p. 727; DOCTERS VAN LEEUWEN, in Ber. Deutsch. Bot. Gesellsch., 31, p. 152—156, t. 3 (1913); SCHMUCKER, in Beih. Bot. Centralbl., 43, 2, p. 49, 66 (1927); WOLFF, in ENGL., Pflanzenr., IV, 228, Heft 90 (1927) p. 267, 375, ic. 24; RANT, in Nat. Tijdschr. Ned. Ind., 89, p. 451 (1929); VAN STEENIS, in Trop. Nat., 19 (1930) p. 78, 89; DOCTERS v. L., in Verh. Kon. Akad. Wetensch. Amsterdam, afd. Natuurk., sect. 2, 31 (1933) p. 257; VAN STEENIS, in Bull. Jard. Bot. Buitenz., sér. III, 13, p. 256 (1934); *Murrithia cordata* ZOLLINGER, in Nat. & Geneesk. Arch. Ned. Ind., 2, p. 576 (1845); HASSKARL, in Flora, 30, p. 601 (1847); ZOLLINGER, Syst. Verz. Ind. Arch. 1842—1848 (1854) p. 139; TEYSMANN & BINNEND., Cat. pl. Hort. Bot. Bogor. (1866) p. 166; *Pimpinella javana* var. *microphylla* JUNGHUHN, Java, ed. HASSKARL, 1, p. 432 (1857).

Pimpinella javana is closely allied to *P. Candolleana* W. & A. from the Nilgherries, the Pullney Hills, Tengyueh and Yunnan, *P. Leschenaultii* CLARKE from the Nilgherries and Ceylon, *P. pulneyensis* GAMBLE from the Pullney Hills, *P. yunnanensis* WOLFF from Yunnan, *P. cambodgiana* DE BOISSIEU from Cambodgia and Yunnan, and *P. coriacea* DE BOISSIEU, from Yunnan.

According to MOLKENBOER l.c. and MIQUEL l.c., *P. javana* differs from *P. Candolleana* by the fruit, which in *P. javana* is hispid, and by the involucre, which in *P. javana* is few-leaved. According to CLARKE, the difference is, that *P. javana* has its upper leaves reduced and not pennatifid, and its fruit less strongly ribbed.

According to MIQUEL l.c. *P. javana* differs from *P. Leschenaultii* by the leaves, that are „rotundata obtusissima” in the latter, and by the stature that is „humilior”.

From the materials of *P. Candolleana* and *P. Leschenaultii* seen by me in the Kew Herbarium, is evident that, between *P. javana* on the one hand and all other species above mentioned on the other hand, there is only one constant difference, viz. that the fruit of *P. javana* is densely hairy with short spreading hairs, whereas in all other species mentioned it is more or less covered with scale-like papillae. The latter species, however, are so little different that it would probably be better to unite them into one. The forms first described as *P. Candolleana* and *P. Leschenaultii* are, indeed, rather distinct, as the former has the lower leaves ovate-cordate, the latter cordate-orbicular, but intermediary forms are not absent, and looking over the whole group of allied forms mentioned in the above, it appears impossible to distinguish among it any well defined species.

As the peculiar fruit indumentum of *P. javana* was not met with by me among the rather polymorphic materials of this alliance, I prefer to keep provisorily *P. javana* apart as a species, though it seems questionable whether this difference is sufficient to justify such a separation.

MOLKENBOER and MIQUEL (ll.cc.) distinguish the varieties *macrophylla*, *sylvestris*, and *microphylla*, especially based on differences in the dimensions of stems and leaves. This variations are, however, too slight to be named as varieties.

Pimpinella javana is common in Java on the mountain summits from G. Soendara eastward, and moreover occurs in Bali. The elevations on which it is found vary between 1200 and 3125 m.

JAVA. G. Soendara, 2000 m el., LÖRZING 441 (B, BD); G. Oengaran, nr. Medini, JUNGHUHN s.n. (L) authentic of *Pimpinella javana* var. *macrophylla* MOLKENB.; G. Merbaboe, 2000 m el., BALLY s.n. (B); 2200 m el., BÜSGEN 201 (B); 2340 m el., JUNGHUHN s.n. (L), authentic of *Pimpinella javana* var. *microphylla* MOLKENB.; 2800 m el., DOCTERS VAN LEEUWEN s.n. (B); 2900 m el., DOCTERS VAN LEEUWEN s.n. (B); 3100 m el., DOCTERS VAN LEEUWEN 1166 and s.n. (B); summit, 3125 m el., DOCTERS VAN LEEUWEN s.n. (B); G. Merapi, JUNGHUHN s.n. (L); WARBURG 4281 (BD); 1200 m el., JUNGHUHN s.n. (L), authentic of *Pimpinella javana* var. *sylvestris* MOLKENB.; G. Lawoe, G. Sidoramping nr. Sarangan, 1800 m el., ALTMAN 192 (B); G. Wilis, TEYSMAN s.n. (B); WARBURG 4220 (BD); upper regions, JUNGHUHN s.n. (L), authentic of *Pimpinella javana* var. *macrophylla* MOLKENB.; above Kediri, 1700—1800 m el., BACKER 11589 (B, L); G. Walirang, ZOLLINGER 2202 (BD), original of *Murrithia cordata* ZOLL. & MOR.; G. Ardjoena, JUNGHUHN s.n. (L), authentic of *Pimpinella javana* var. *microphylla* MOLKENB.; summit Widadarèn, 2100 m el., KOORDERS 38251 β (B, L); Laliidjiwo, WURTH s.n. (B); RANT s.n. (B); 2500 m el.,

KOORDERS 43853 β (B); above Lalidjiwo, 2800 m el., BREMEKAMP s.n. (B); DE VOOGD s.n. (B); G. Kawi, summit, JUNGHUHN s.n. (L), authentic of *Pimpinella javana* var. *microphylla* MOLKENB.; G. Boetak, 2500 m el., DOCTERS VAN LEEUWEN 12426 (B); 2650—2800 m el., DOCTERS VAN LEEUWEN 12456, 12209 (B); G. Tengger, KOORDERS 37883 β (B); Casuarina forest, VAN SLOOTEN 2342 (B); above Tosari, RANT s.n. (B); ZEYLSTRA 6 (B); 1800 m el., POSTHUMUS s.n. (G); 2000—2400 m el., BACKER 8382 (B, L); 2200—2300 m el., BACKER & POSTHUMUS s.n. (B); Tjemara Poekoel, 2000 m el., DOCTERS VAN LEEUWEN 4562 (B); between Tosari and Ngadiwono, 2000—3000 m el., MOUSSET 337 (B, BD); between Tosari and Ngadisari, WENT s.n. (L); nr. Ngadisari, 2200 m el., KOORDERS 37879 β (B, L), v.n.: *kemboan*; G. Kembang, nr. Ngadisari, 2100 m el., KOORDERS 37880 β (B), v.n.: *kemboan*; between Tosari and the Penandjaan, 2400 m el., LEEFMANS 17 (B, L); Moenggäl and Penandjaan, 2200—2500 m el., KOBUS s.n. (B, L), v.n.: *glongong, soempoengan*; Moenggäl Pass, 2400 m el., WISSE 509 (B); JESWIET 598 (B); Bromo forest, JESWIET s.n. (B), v.n.: *kemboan*; G. Widadaren, nr. Kadoenen, 2300—2400 m el., KOORDERS 37881 β (B, L); 37882 β (B), v.n.: *gembokan*; G. Widadaren, summit, JUNGHUHN s.n. (L), authentic of *P. javana* var. *microphylla* MOLKENB.; G. Seméroe, ZOLLINGER l.c.; G. Ijang, G. Krintjing, 2400—2700 m el., BREMEKAMP & BACKER 9824 (B); G. Idjen, ZOLLINGER l.c.

BALL. VAN STEENIS, after communication by letter of June 13, 1936.

3. *Pimpinella pruatjan* MOLKENBOER — Perennial herb. Stems several. ascending, 5—50 cm high, sometimes spread and rooting and forming rosettes, terete, striate, puberulous when young, later glabrescent. Leaves for the greater part in rosettes; petioles to 10 cm long with a sheath to 3 cm long; lamina imparipennate, with 3—11 leaflets (rarely only one), these leaflets sessile or subsessile, roundly-cordate, 1—2.5 cm long crenate-serrate to bicrenate-serrate, or slightly lobed, the upper leaves shorter-petioled and smaller, with leaflets less deeply incised and narrower more acute segments, all leaves sparingly hairy above, densely so below in the youth, glabrescent later. Inflorescences terminal to the stems and the branches, but often seemingly opposite to the leaves; peduncles 1—7 cm long; rays 4—8 in number, 7—25 mm long; pedicels 4—8 in each umbel, 1—4 mm long; involucre and involucels 3—6-leaved, the bracts nearly filiformous, those of the involucels shorter than the outer pedicels. Calyx teeth none; petals nearly 1.25 mm long by 1 mm broad, with inflexed tip. Mericarps nearly 2 mm long, 1 mm broad, warty. (Description after the materials under mentioned.)

Heterochaena alpina ZOLLINGER, in Nat. & Geneesk. Arch. Ned. Ind., 2, p. 577 (1845); *Anisometros alpina* HASSKARL, in Flora, 30, p. 602 (1847); ZOLLINGER, Syst. Verz. Ind. Arch. 1842—1848, p. 139 (1854); *Pimpinella pruatjan* MOLKENBOER, in MIQUEL, Pl. Junghuhn., p. 97 (1851) cum var. *depressa*; MIQUEL, Fl. Ind. Bat., I, 1, p. 739 (1856) cum var.s *depressa* & *polyphylla*; JUNGHUHN, Java, ed. HASSKARL, 1, p. 432 (1857); TEYSMANN & BINNEND., Cat. pl. Hort. Bot. Bogor. (1866) p. 166; MIQUEL,

III. Fl. Arch. Ind. (1871) p. 40; FILET, Plantk. Woordenb. (1876) p. 252; BECCARI, Malesia, 1 (1877) p. 219; in Bot. Jahrb., 1, p. 29 (1881); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 618; WIGMAN, in Teysmannia, 4, p. 740, 743 (1893); KOORDERS, in Nat. Tijdschr. Ned. Ind., 60, p. 371 (1901); DE CLERCQ, Plantk. Woordenb. (1909) p. 304; KOORDERS, Exkursionsfl. Java, 2 (1912) p. 727; DOCTERS VAN LEEUWEN, in Verh. Kon. Akad. Wetensch. Amsterd., afd. Natuurk., sect. 2, 31 (1933) p. 124; VAN STEENIS, in Bull. Jard. Bot. Buitenz., sér. III, 13, p. 256 (1934); p. 390 (1935); *Pimpinella Panatjan* MIRB., ex ROSENTH., Syn. Pl. Diaphor., p. 533 (1862); *Carum Panatjan* BAILLON, Hist. Pl., 7 (1880) p. 178; *Pimpinella alpina* (non HOST 1827) KOORDERS-SCHUM., Syst. Verz., I, 1, fam. 228 (1911) p. 98; KOORDERS, Exkursionsfl. Java, 2 (1912) p. 728; HEYNE, Nutt. Pl. Ned. Ind., ed. 1, 3 (1917) p. 399; WOLFF, in ENGLER, Pflanzenr., IV, 228, Heft 90 (1927) p. 272; HEYNE, Nutt. Pl. Ned. Ind., ed. 2 (1927) 2, p. 1214; RANT, in Nat. Tijdschr. Ned. Ind., 89, p. 451 (1929); VAN STEENIS, in Trop. Nat., 19 (1930) p. 77, 78, 83, 84, 89, 90; DOCTERS VAN LEEUWEN, in Verh. Kon. Akad. Wetensch. Amsterdam, afd. Natuurk., sect. 2, 31 (1933) p. 195; BURKILL, Diction. Econ. Prod. Mal. Pen., 2, p. 1728 (1935); *Pimpinella Leeuwenii* WOLFF, in FEDDE, Repert., 20, p. 159 (1924); in ENGL., Pflanzenr., IV, 228, Heft 90 (1927) p. 273; VAN STEENIS, in Trop. Nat., 19 (1930) p. 78; DOCTERS VAN LEEUWEN, in Verh. Kon. Akad. Wetensch. Amsterdam, afd. Natuurk., sect. 2, 31 (1933) p. 57, 68, 124, 195; *Pimpinella pruatjan* var. *prolifera* VAN STEENIS, in Bull. Jard. Bot. Buitenz., sér. III, 13, p. 349 (1935).

Pimpinella pruatjan is closely allied to *P. ascendens* DALZIELL, from Peninsular India. In *P. pruatjan* the leaves are often tripartite, usually pennate with 5 leaflets, rarely with up to 11 leaflets, the fruit granular-sealy. In *P. ascendens* the leaves are pennate with usually 7, rarely down to 3 leaflets, the leaflets are usually smaller and always sessile, the fruit are short-hairy. The leaf differences are certainly inadequate to distinguish the two as different species, and that in the indumentum of the fruit perhaps neither, though it is very remarkable.

Pimpinella pinetorum MERRILL, from the Philippines, is also closely allied; it has the fruit sparingly and shortly hairy, and for the rest strongly resembles *P. pruatjan*; therefore it is hardly specifically different from *P. pruatjan*, and certainly not from *P. ascendens*.

Pimpinella Leeuwenii, distinguished by WOLFF, certainly is not more than a variety of *P. pruatjan*, as VAN STEENIS remarked, who called it var. *prolifera* (l. c.). WOLFF enumerates as distinctive characters of *P.*

Leeuwenii: the lack of an erect flower bearing stem, the forming of long sympodic stolones bearing inflorescences opposite the leaves and forming rosettes, and the marked heterophylly. Indeed, such specimens occur, but between them and the typical *P. pruatjan* there are so many intermediate forms, that *P. Leeuwenii* cannot be maintained as a species and hardly as a distinct variety. The fruit of *P. Leeuwenii* is entirely like that of *P. pruatjan*, and shows the same differences with *P. ascendens*.

Pimpinella pruatjan occurs in the mountains of Java from 1800 to 3300 m elevation; its most western locality is on Mt. Pangrango, its most eastern on Mt. Argapoera.

The species name *pruatjan* is the native name used by the Javanese in Mt. Diëng, according to JUNGHUHN; the correct form of the name probably is *poerwotjèng*, as given by TEYSMANN and WIRJOSAPOETRO.

JAVA. Without exact locality: JUNGHUHN s.n. (L); G. Pangrango, 3000 m el., DOCTERS VAN LEEUWEN 5586 (B, L), 5729 (B, BD, type of *Pimpinella Leeuwenii* WOLFF); STOMPS s.n. (B); VAN STEENIS 4656 (B); G. Papandajan, summit, 2622 m el., VAN DER PLJL 208 (B); slope, and G. Saroni, VAN STEENIS 4121 (B, K); Tegal Pandjang, 2041 m el., VAN STEENIS 4230 (B, K, S); S. of G. Djaja, 2050 m el., ECOMA VERSTEGE s.n. (B), v.n.: *antan kawat*; ravine Tjiparoegpoeg and Tegal Aloen-aloen, 2400—2600 m el., VAN STEENIS 4101 (B, K); ibidem, 2450—2500 m el., DOCTERS VAN LEEUWEN 13146 (B), 13171 (B, K), 13173 (B); 2650 m el., POLAK s.n. (B); G. Tjikoerai, summit, 2818 m el., SCHEFFER D33, D34 (B), v.n.: *kioerad*, *antan goenoeng*; 2500—2800 m el., DOCTERS VAN LEEUWEN 8360 (B, BD, K, L), erroneously 3360 in several herbaria; G. Prahoe, HORSFIELD s.n. (K); Diëng, dèsa Diëngkoelon, 2000 m el., WIRJOSAPOETRO 59 (L), v.n.: *poerwotjeng*; TEYSMANN s.n. (B), v.n.: *poerwotjeng*; 1860 m el., JUNGHUHN s.n. (L), v.n.: *pruatjan*, authentic of *Pimpinella pruatjan* MOLKENB.; 2060 m el., BACKER 21741 (B); G. Oengaran nr. Medini, JUNGHUHN s.n. (L), authentic of *Pimpinella pruatjan* MOLKENB.; G. Merbaboe, above Sèlo, WARBURG 4221 (BD), v.n.: *tjoemboean*; G. Ardjoena, 2100—3300 m el., ZOLLINGER 2252 (B, BD), originals of *Heterachaena alpina* ZOLL. & MOR. = *Anisometros alpina* HASSKARL; 2400—3000 m el., KOORDERS 38252 β 43794 β (B); summit, way to Lalidjiwo, WURTH s.n. (B); above Lalidjiwo, 3000 m el., BREMEKAMP s.n. (B); G. Kawi, Oro-ro, 2600 m el., DOCTERS VAN LEEUWEN 12355 (B); G. Boetak, 2850 m el., DOCTERS VAN LEEUWEN 12217 (B); G. Tengger, 2400 m el., ZOLLINGER 2252 (B, L), originals of *Heterachaena alpina* ZOLL. & MOR. = *Anisometros alpina* HASSKARL; Tosari, 1800—2500 m el., KOBUS s.n. (B), v.n.: *ketoembar ales*; Moenggal Pass, Penandjaan, 2200—2500 m el., KOBUS s.n. (B); Moenggal Pass, RIDLEY s.n. (K); 2200—2400 m el., BACKER 1119 (B); way to Penandjaan, RANT s.n. (B); G. Batok, 2200 m el., KOORDERS 37886 β (B), v.n.: *roempoet dempoh*; G. Widadarèn, Kedoewan, Roedjah, 2300 m el., KOORDERS 37885 β (B), v.n.: *soeri pandok abong*; summit, JUNGHUHN l.c.; summit, 2400 m el., KOORDERS 37884 β (B, L), v.n.: *gebangan depok*; Penandjaan, 2650 m el., DOCTERS VAN LEEUWEN 4575 (B); G. Argapoera, 2500—2800 m el., BACKER 13331 (B); summit, 3020 m el., KOORDERS 43453 β (B, L).

XVII. OENANTHE

LINN., Sp. pl., ed. 1 (1753) 1, p. 254; Gen. pl., ed. 5 (1754) p. 122; BENTHAM & HOOK.F., Gen. pl., 1, p. 905 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 695 (1879); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 620; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 204 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1249 (1926); *Dasyloma* D. C., Prodr., 4 (1830) p. 140; *Sium* sect. *Drepanophyllum* BLUME, Bijdr. Fl. Ned. Ind., 15 (1826) p. 881.

Only species:

1. *Oenanthe javanica* (BL.) D. C. — Perennial herb, entirely glabrous. Stems 10—100 cm high, erect or ascending from a creeping base, terete, ramose. Leaves petioled and with sheath; petiole up to 10 cm long, often entirely sheathy; lamina pennate to bipennate with ovate serrate to narrowly oblong segments, or the segments divided again, this making the leaf 4—5-pennate. Inflorescences terminal and opposite to the leaves; peduncles 1—20 cm long, rarely none; umbel rays 0.5—3 cm long, 5—15 in number; pedicels 10—25 in each umbellule, 2—5 mm long; involucre none or one-leaved, involucrels with 2—8 linear 2—4 mm long leaves. Calyx teeth distinct, acute, nearly 0.5 mm long; petals nearly 1 mm long, 0.75 mm broad, with a long inflexed tip. Mericarps 2—3 mm long, 0.5—1 mm broad, with swollen ribs, the marginal ones much more swollen than the dorsal ones, the latter, if strongly swollen often nearly entirely confluent.

Sium javanicum & *Sium laciniatum* BLUME, Bijdr. Fl. Ned. Ind., 15 (1826) p. 881; *Falcaria javanica* D. C., Prodr., 4 (1830) p. 110; HASSKARL, Aant. nut. (1845) p. 115; MOLKENBOER, in MIQUEL, Pl. Junghuhn., p. 95 (1851); *Falcaria laciniata* D. C., Prodr., 4 (1830) p. 110; MOLKENBOER, in MIQ., Pl. Junghuhn., p. 96 (1851); *Oenanthe stolonifera* D. C., Prodr., 4 (1830) p. 138; KURZ, in Journ. As. Soc. Beng., 46, p. 115 (1877); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 696 (1879); DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 204 (1898); BAILEY, Queensl. Fl., 2 (1900) p. 726; KOORDERS, in Nat. Tijdschr. Ned. Ind., 60, p. 370 (1901); MATS. & HAYATA, Enum. pl. Formosa (1906) p. 172; DE CLERCQ, Plantk. Woordenb. (1909) p. 292; HOSSEUS, in Beih. Bot. Centralbl., 28, 2, p. 421 (1911); RIDLEY, in Transact. Linn. Soc., ser. II, bot., IX, 1 (1916) p. 63; in Journ. F. M. S. Mus., VIII, 4 (1917) p. 42; Fl. Mal. Pen., 1 (1922) p. 871; CHERMEZON, in LEC., Fl. Indo-Ch., 2, p. 1149 (1923); CRAIB, Fl. Siam. enum., 1, p. 790 (1931); *Oenanthe linearis* D. C., Prodr., 4 (1830) p. 138; CLARKE, in HOOK.F., Fl. Br.

Ind., 2, p. 696 (1879); DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 204 (1898); CHERMEZON, in LEC., Fl. Indo-Ch., 2, p. 1149 (1923); *Oenanthe javanica* D.C., Prodr., 4 (1830) p. 138; HASSKARL, Cat. pl. Hort. Bot. Bogor. (1844) p. 163; ZOLLINGER, Syst. Verz. Ind. Arch. 1842—1848 (1854) p. 139; MIQUEL, Fl. Ind. Bat., I, 1, p. 740 (1856); TEYSMANN & BENNEND., Cat. pl. Hort. Bot. Bogor. (1866) p. 166; MIQUEL, Ill. Fl. Arch. Ind. (1871) p. 41; FILET, Plantk. Woordenb. (1876) p. 297; KOORDERS-SCHUM., Syst. Verz. I, 1, fam. 228 (1911) p. 99; KOORDERS, Exkursionsfl. Java, 2 (1912) p. 729; HEYNE, Nutt. Pl. Ned. Ind., ed. 1, 3 (1917) p. 400; BÜNNEMELJER, in Trop. Nat., 7 (1918) p. 70, ic. 7; OCHSE, Trop. groenten (1925) p. 190, ic. p. 191; HEYNE, Nutt. Pl. Ned. Ind., ed. 2 (1927) 2, p. 1215; VAN STEENIS, in Trop. Nat., 17 (1928) p. 205; LAM, in Nat. Tijdschr. Ned. Ind., 89, p. 351 (1929); DAKKUS, in Bull. Jard. Bot. Buitenzorg, sér. III, suppl. 1 (1930) p. 208; OCHSE & BAKH., Ind. groenten (1931) p. 715, ic. 434; VAN STEENIS, in Bull. Jard. Bot. Buitenzorg, sér. III, 9, p. 168 (1932); BURKILL, Diction. Econ. Prod. Mal. Penins. (1935) 2, p. 1578; *Dasyloma benghalensis* D.C., Prodr., 4 (1830) p. 140; WIGHT, Ic. pl., t. 568 (1843); MIQUEL, Fl. Ind. Bat., I, 1, p. 742 (1856); *Phellandrium stoloniferum* ROXBURGH, Hort. Beng. (1814) p. 21, nomen; Fl. Ind., ed. CAREY, 2 (1832) p. 93; ed. CLARKE (1874) p. 271; *Oenanthe laciniata* ZOLLINGER, Syst. Verz. Ind. Arch. 1842—1848 (1854) p. 139; MIQUEL, Ill. Fl. Arch. Ind. (1871) p. 42; KOORDERS-SCHUM., Syst. Verz., I, 1, fam. 228 (1911) p. 99; KOORDERS, Exkursionsfl. Java, 2 (1912) p. 728; MERRILL, Bibl. Enum. Born. Pl. (1921) p. 459; Enum. Phil. Fl. Pl., 3, p. 239 (1923); RIDLEY, in Journ. Mal. Br. Roy. As. Soc., 1, p. 63 (1923); *Dasyloma javanicum* & *Dasyloma laciniatum* MIQUEL, Fl. Ind. Bat., I, 1, p. 741 (1856); TEYSMANN & BENNEND., Cat. Pl. Hort. Bot. Bogor. (1866) p. 165; FILET, Plantk. Woordenb. (1876) p. 168, 239; *Dasyloma japonicum* & *D. subbipinnatum* MIQUEL, Ann. Mus. Bot. Lugd. Bat., 3 (1867) p. 59; *Oenanthe benghalensis* BENTH. & HOOK.F., Gen. pl., 1, p. 906 (1867); CLARKE, in HOOKER FIL., Fl. Br. Ind., 2, p. 696 (1879); KOORDERS, Versl. Dienstr. Minah. (1898) p. 488; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 204 (1898); MATSUMURA & HAYATA, Enum. Pl. Formos. (1906) p. 172; KOORDERS-SCHUM., Syst. Verz., III (1914) p. 100; CHERMEZON, in LEC., Fl. Indo-Chine, 2, p. 1148 (1923); CRAIB, Fl. siam. enum., 1, p. 790 (1931); ? *Oenanthe Thomsoni* CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 697 (1879); DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 204 (1898); CHERMEZON, in LEC., Fl. Indo-Chine, 2, p. 1150 (1923); *Oenanthe stolonifera* var. *javanica* KUNTZE, Rev. gen. pl., 1 (1891) p. 269;

Oenanthe Schlechteri WOLFF, in SCHUM. & LAUTERB., Nachtr. Fl. deutsch. Schutzgeb. (1905) p. 333, t. 14; LANE-POOLE, For. res. Papua (1925) p. 130, 181.

Oenanthe javanica is very variable as to the dimensions of all its parts, the compoundness of its leaves, the length of its peduncles, the number of pedicels in its umbellules, and the dimensions of its fruit. The form with pennatifid to pennatipartite leaflets was originally distinguished as a distinct species, *Sium laciniatum*, from the less divided form *Sium javanicum*, but a complete series of intermediary forms proves that these strikingly different forms are only extreme varieties of one species.

Oenanthe stolonifera is, since long, recognized as synonymous with *Oe. javanica*, but the species name *javanica* has priority over that of *stolonifera*.

Oenanthe benghalensis is said by KOORDERS to be found by him in Selebes. According to CLARKE the real *Oe. benghalensis* is distinguished from *Oe. javanica* by peduncles very short or none, leaves strongly divided, and the fruit very short; to these differential characters CHERMEZON adds that the styles are shorter than half the length of the fruit, and that the calyx teeth are very short. The specimen collected by KOORDERS in the Minahassa has peduncles up to 7 cm long and for the rest does not show the differential characters mentioned. In the further material mentioned below there occur, however, specimens that in several respects agree with the descriptions as given by CLARKE and CHERMEZON, but there can be traced no limit between the forms that can be reckoned to *O. benghalensis* and those that can not. From the materials present in the Kew Herbarium appears that in British India *O. benghalensis* is distinctly different from *O. javanica*, and in these materials *O. benghalensis* is, besides by the characters mentioned above, characterised by the stems strongly branched from the base; however in the materials from China and Japan, in the same herbarium, the limits between *O. benghalensis* and *O. javanica* become quite undefined, as is the case in the Malay Archipelago. It is therefore that I prefer to consider *O. benghalensis* as a form of *O. javanica*.

In Sumatra there have been collected, moreover, two forms that, being strongly different as to the leaves, make the impression of being separate species.

The first of them is represented by the numbers OUWEHAND 157 and 345 (see below), and is remarkable by leaves pennate to bipennate, with segments up to 4 cm long and 1—4 mm broad, entire, or sometimes with 2 or 3 incisions in the apical part. These plants have been

labelled by C. A. BACKER as *Oenanthe linearis*, and indeed they agree with the descriptions of this species as given by DE CANDOLLE, CLARKE and CHERMEZON. When we compare it with the originals of *O. linearis* extant in the Kew Herbarium, we are struck by the fact, that the Sumatra plant is a more extreme form than these originals. Also in China there occur forms that are intermediates between the most typical form, as represented by OUWEHAND's plants, and common *O. javanica*. One of these has been described as *O. rivularis* by DUNN (in Journ. Linn. Soc., 35, p. 496); it is said to differ from *O. linearis* by the leaves long-petioled and with short sheath, and by „foliis tenuis dissectis”, but it is apparently intermediate between *O. linearis* and *O. javanica*.

The second of them is represented by the number PRINGGO 170, with leaves 3—5-pennate and segments only 1—2 mm long, 0.5—1 mm broad. It has been labelled as *O. Thomsonii* by VALETON, and indeed agrees with the descriptions of this species, as given by CLARKE and CHERMEZON, as well as with the originals of *O. Thomsonii* in the Kew Herbarium. Yet I can not acknowledge it as a separate species, as between it and *O. javanica* there exist, among the materials mentioned, a complete series of intermediate forms.

Oenanthe Schlechteri, from New Guinea, is distinguished by WOLFF from *Oe. javanica* on account of its small fruit, of which only the marginal ribs are strongly swollen, the dorsal ribs, on the contrary, not at all, so that, after WOLFF, there might be good grounds to base upon *Oe. Schlechteri* a new section of the genus *Oenanthe*. That *Oe. Schlechteri* may hardly be considered as a slight variety of *O. javanica* is proved by the following facts. WOLFF describes the fruit of *Oe. Schlechteri* as 2 mm long, 1.5 mm broad (by typographical error 2 cm by 1.5 cm). Now the fruit of further materials of the species vary from 2 to 3 mm in length and from 0.5—1 mm in breadth, from which we see that *Oe. Schlechteri*, in this respect, is not even an extreme variation of *Oe. javanica*. As to the second difference we may remark the following. According WOLFF's own figure (Nachträge t. 14) the fruit of *Oe. Schlechteri* are normal *Oenanthe*-fruit, but with the dorsal ribs only slightly swollen. Such fruit, however, and fruit with the dorsal ribs swollen to the most different degrees, may be found among the materials of *Oe. javanica* enumerated below, and that not only as different varieties, but often on the same plant or even in the same inflorescence.

MALAY PENINSULA. Penang, cultivated at Ayer Stone, nr. sea level, HOLTTUM s.n. (K), v.n.: *selomor*, *shelum*; Dindings, Lumut, RIDLEY & CURTIS s.n. (S); Perak, Temanggo, RIDLEY 14604 (BM, S), v.n.: *lompong*.

SUMATRA. Atjèh, Lant Toepandji, 1900 m el., VAN STEENIS 6374 (B); Pak-pak, Koeta Benö, PRINGGO ATMODOJO (Exp. VAN DAALLEN) 509 (B, L); Gajoeloeüs, Woihnikela, PRINGGO ATMODOJO (Exp. VAN DAALLEN) 170 & 181 (B, L); San Klewang valley, N.E. of Sibolangit, 350 m el., LÖRZING 4088 (B); Karo Plateau, foot of Daleng Koetoe, 1250 m el., LÖRZING 4912 (B); Berastagi, RIDLEY s.n. (K); BURKILL 104 (S); Berastagi, 1300 m el., LÖRZING 6737 (B); below G. Sibogal, 1200 m el., HOLTTUM 15456 (K, S); Petami valley, 1300 m el., LÖRZING 6015 (B, L, U); Lagoe Roti in Lake Toba, 900 m el., OUWEHAND 157 (B); Ranau Dolok, 1100 m el., OUWEHAND 345 (B); between Pisopiso and Tonggin, on Lake Toba, 1300 m el., LÖRZING 8114 (B); S. foot of Pisipiso, 1400 m el., LÖRZING 9379 (B); Pinto, summit, 2200 m el., LÖRZING 8281 (B, L); „Prubatua”, HAGEN s.n. (B), v.n.: *batjarongi*; Toba plateau nr. Sidamanik, BEUMÉE A452 (B); G. Talang, 350 m el., BÜNNEMEIJER 5667 (B, L, U); G. Kerintji, Soengai Koembang, 1350 m el., ROBINSON & KLOSS 75 (BM) and s.n. (K, S); 1600—2020 m el., BÜNNEMEIJER 8723 (B, K, S), 8984, 9464, 9607, 9724 (B); Bèngkoeloe, Liwa, 800 m el., DE VOOGD 115 (B), v.n.: *rundji*; Bt. Daoen, 1300 m el., DE VOOGD 1407 (B); Moeairadoea, 150 m el., GRASHOFF 472 (B), v.n.: *piopo*; Kp. Oedjoeng, e. of G. Pesagi, 1000 m el., VAN STEENIS 3716 (B).

POELAU LINGGA. S. Pangga, TEYSMANN s.n. (B).

ANAMBAS & NATOENA ISLANDS. Siantar, e. of Tarèmpa, 90—100 m el., HENDERSON 20247 (S), VAN STEENIS 996 (B, S).

BORNEO. Without exact locality (Bandjarmasin, ex MIQUEL), KORTHALS s.n. (L).

JAVA. Without exact locality: VAN HASSELT s.n. (L); BLUME s.n. (B, L), v.n.: *tespong*; KORTHALS s.n. (L); ZIPPELIUS s.n. (L); ZOLLINGER 2235 (BD, BM); HORSFIELD s.n. (K, S), 418 (K), v.n.: *pampoeng*; NAGEL 230 (BD); HILLEBRAND s.n. (BD); WAITZ s.n. (L); LAHAYS 43 (BM); „Tjisereh”, KUHLE & VAN HASSELT 748 (B); G. Megamendoeng, ZIPPELIUS s.n. (L); Nirmala, 1000 m el., BACKER 10822 (B); G. Perbakti, n.w. of Tjitjoeroeg, Tjikerang, 1500 m el., BAKHUIZEN VAN DEN BRINK 6605 (B), v.n.: *tespong*; G. Gedé, Tjibodas, REINWARDT 589? (L); Tjibodas, 1200 m el., KOORDERS 31731 β (B), v.n.: *tespong*; between Tjibodas and Tjibeureum, HALLIER 380, 439 (B), v.n.: *tespong*; Tjibeureum, 1600 m el., BOERLAGE s.n. (B, L); PULLE 4034 (U); REYNVAAN 28 (G); DEN BERGER 623 (B); DANSER 5953 (G); VAN STEENIS 1910 (B); SAPIIN s.n. (B), v.n.: *tespong*; above Tjibodas, 1600 m el., BACKER 13542, 31382 (B); Rarahan, 1400 m el., BACKER 13650 (B); Geger Bintang, BURCK 586 (B), v.n.: *tespong*; SAPIIN s.n. (B), v.n.: *tespong*; G. Semboeng, s.w. of Bandoeng, 1300 m el., BACKER 12277 (B, L); S. of Tjibeber, 950 m el., BACKER 22366 (B, L); 1000 m el., WINCKEL 1135 β (B), v.n.: *tespong*; BAKHUIZEN VAN DEN BRINK 1854 & 2611 (B), v.n.: *tespong*, *kitespong*; Tjadas Malang nr. Tjidadap, S. of Tjibeber, 1000 m el., WINCKEL 1360 β (B), v.n.: *tespong*; BAKHUIZEN VAN DEN BRINK 2497 (B), v.n.: *tespong*; Takokak, 1000 m el., KOORDERS 15036 β , 15246 β (B), v.n.: *tespong rawa*; Rantja Oepas nr. Telaga Patengan, 1750 m el., BACKER 12710 (B); G. Patoeha nr. Rantjawalini, 1725 m el., LÖRZING 1312 (B); above Rawah Tjiwidej, 1900 m el., VAN STEENIS 6963 (B); G. Malabar, 1200—2100 m el., ANDERSON 190 (K); Pengalengan, WARBURG 3122 (BD); Rantja Gedé nr. Pengalengan, 1600 m el., BACKER 26093 (B); Taloen nr. Bandoeng, 1600 m el., REYNVAAN s.n. (B); G. Telagabodas, BOERLAGE s.n. (L); HASSKARL s.n. (B), v.n.: *tespon*; BURCK 127 (B), v.n.: *tespong*; KORTHALS s.n. (L); G. Galoenggoeng above

Singaparna, 600 m el., BACKER 8635 (B); Rawah Oepoe nr. Kali Poetjang, 10 m el., BACKER 4473 (B); G. Tjeremai, above Linggardjati, 560 m el., BACKER 4883 (B, K, L); Petoengkriana, 900 m el., BACKER 15958 (B); 1300—1600 m el., BACKER 15798 (B); between Dara & Petoengkriana, 1000—1200 m el., BACKER 15714 (B); G. Diëng, JUNGHUHN s.n. (L), v.n.: *pambong*; TEYSMANN s.n. (B), v.n.: *pampoeng*; WARBURG 4224 (BD); DOCTERS VAN LEEUWEN 2259 (B); Diëng Plateau, 2000 m el., BACKER 21691 (B), v.n.: *pampong alas*; Telaga Dringoe, 2000 m el., VAN SLOOTEN 420 (B); G. Boetak, E. of Tlerep, 1800 m el., LÖRZING 69 (B, BD), v.n.: *bampocng*; Garoeng, 1100—1400 m el., BACKER 21909 (B); Bandungan, 1000 m el., KOOPER 39 (B); G. Soendara, nr. Kledoeng, 1600 m el., BLOKHUIS s.n. (B), Oengaran, Medini, JUNGHUHN s.n. (L), v.n.: *ketol*; G. Telemaja, KOORDERS 28045 β (B), v.n.: *pangpoeng*; 1300 m el., DOCTERS VAN LEEUWEN 198 (B); Sepakoeng, 1000 m el., KOORDERS 36318 β (B), v.n.: *pampoeng*; Pager Goenoeng, S.W. of Semarang, 1000 m el., DOCTERS VAN LEEUWEN 175 (B); Pening, in the Rawah Pening, nr. Ambarawa, KOORDERS 29655 β (B), v.n.: *pampoeng*; Banjoebiroc, Rawah Pening, KOORDERS 36236 β (B), v.n.: *pangpoeng*; Salatiga, DOCTERS VAN LEEUWEN s.n. (B); G. Merapi, nr. Bedojo, 390 m el., JUNGHUHN s.n. (L); 1500—1800 m el., JUNGHUHN s.n. (L); G. Willis, Ngebel, 700 m el., KOORDERS 23194 β (B); Batoe, nr. Malang, RANT s.n. (B); G. Tengger, road to Poespo, RIDLEY s.n. (K); Tosari, RIDLEY s.n. (K); Ngadisari, 2000 m el., KOORDERS l.c., v.n.: *ketoembar*; Smeroe hoeve, 2100 m el., VAN STEENIS 7278 (B); G. Ijang, 2100 m el., CLASON G9 (G), v.n.: *matjen salade ajer*; Ijang Plateau, 2100 m el., KOORDERS 43432 β (B), v.n.: *sladri gunung*; Kali Deloeang, 2200 m el., BACKER 9570 (B); Telaga Trata nr. Poeger, 5 m el., KOORDERS 21377 β (B), v.n.: *seladren*; G. Idjen, swamp nr. temple, VAN DER PIJL 147 (B); Idjen Plateau, Rawah Simpol, 900 m el., KOORDERS 43164 β (B); Sempol, 1100 m el., BACKER 25047 (B); Ragadjampi, ZOLLINGER 2588 (B, BM).

LESSER SUNDA ISLANDS. Without exact locality, DE VOGD 1851 (B).

BALL. Batoeriti, Danau Bratan, RUTTNER 316 (B).

LOMBOK. Swela, 362 m el., RENSCH 76 (B).

SELEBES. Tomohon, SARASIN 540 (BD); REINWARDT 756 (L); between Tomohon and Tondano, 700 m el., KOORDERS 19031 β (B); Tondano, FORSTEN 78 (L), v.n.: *roekoet telemmé*; Sidoa, forest above Napoe, adjunct veterinary surgeon of Donggala no. 97 (B); Sogori, FORSTEN 885 (BM).

BOEROE. Lake Rana, 800 m el., L. J. TOXOPEUS 228 (B, L).

NEW GUINEA. On the Rouffaer River, DOCTERS VAN LEEUWEN 9723 (B); 175 m el., DOCTERS VAN LEEUWEN 9904 (B); Nassau Mts., 1200 m el., DOCTERS VAN LEEUWEN 10735 (B); affluent of the Swart River, S. slope, 1250 m el., LAM 2076 (B), alcohol materials only; Utakwa Expedition, Camp III—IX, 900—1650 m el., KLOSS s.n. (BM); Camp VIe & VII—IX, KLOSS s.n. (K); Kloof Bivouac, 30 m el., PULLE 162a—g (B); Oroh valley, cultivated in native villages, 1300 m el., PULLE 1175 (B); Noord River, VON RÖMER 125 or 123 (B); Saruwaged Mts., Ogeramngang, 1800 m el., MAYR 826 (BD); Sepik River, bivouac 42, SCHULTZE 185 (BD); on the Waria, nr. Gobi, 350 m el., SCHLECHTER 19846 (BD); Schumann River, SCHLECHTER 13821 (B, BD, cotype of *Oenanthe Schlechteri* WOLFF); Finschhafen District, Nomi River, 1500 m el., and Kulentufu Ioangey, ex LANE POOLE l.c.; Mt. Tafa, 2100 m el., BRASS 4150 (NY); Mafulu, 1250 m el., BRASS 5334 (NY); Mt. Scratchley, Neneba, about 1200 m el., GIULIANETTI s.n. (K).

Distribution: British India, China, Japan, Siam, Formosa, Philippines, Queensland.

XVIII. FOENICULUM

ADANSON, Fam. pl., 2 (1763) p. 101; BENTH. & HOOK.F., Gen. pl., 1, p. 902 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 695 (1879); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 619; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 208 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1284 (1926).

Only species:

1. **Foeniculum vulgare** MILLER — Perennial herb, entirely glabrous. Stems erect, up to 2 m high. Leaves with membranous-margined sheath, in the lower leaves 4—12 cm long, shorter in the upper ones, and with cucullate-connate auricles at the top; lamina usually 3—4-pennate, with filiformous segments. Compound umbels terminal to the stem and the branches; peduncles 5—16 cm long; involucre and involucels none; umbel rays 30—70 in number, 5—7 cm long; pedicels 5—30 in each umbellule, 0.5—1 cm long. Calyx teeth none; petals yellow, strongly curled inward. Mericarps oblong, nearly 8 mm long 2 mm broad, with filiformous nearly equal ribs, not at all winged.

Anethum Foeniculum LINN., Sp. pl., ed. 1 (1753) 1, p. 263; *Foeniculum vulgare* MILLER, Gard. diet., ed. 8 (1768); D. C., Prodr., 4 (1830) p. 142; WIGHT & ARNOTT, Prodr., (1834) p. 371; HASSKARL, Cat. Pl. Hort. Bot. Bog. (1844) p. 164; JUNGHUHN, in Nat. & Geneesk. Arch. Ned. Ind., 2, p. 33 (1845); MOLKENBOER, in MIQ., Pl. Jungh., p. 98 (1851); MIQUEL, Fl. Ind. Bat., I, 1, p. 742 (1856); suppl. Sum. (1860) p. 134; TEYSMANN & BINNEND., Cat. Pl. Hort. Bot. Bogor. (1866) p. 166; MIQUEL, Ill. Fl. Arch. Ind. (1871) p. 43; FILET, Plantk. Woordenb. (1876) p. 1; BAKER, Fl. Maur. & Seych. (1877) p. 133; CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 695 (1879); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 620; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 208 (1898); KOORDERS, Versl. Dienstr. Minah. (1898) p. 488; in Teysmannia, 11, p. 239 (1901); in Nat. Tijdschr. Ned. Ind., 60, p. 370 (1901); MATSUMURA & HAYATA, Enum. pl. Formos. (1906) p. 171; DE CLERCQ, Plantk. Woordenb. (1909) p. 243; DE JONG, in Teysmannia, 20, p. 351 (1909); BACKER, in Ann. Jard. Bot. Buitenz., suppl. 3, 1 (1910) p. 402; KOORDERS-SCHUM., Syst. Verz., I, 1, fam. 228 (1911) p. 99; KOORDERS, Exkursionsfl. Java, 2 (1912) p. 729; HAYATA, Ic. pl. Formos., 5 (1912) p. 54; VAN DONGEN, Overz. geneesmidd. Ned. Ind. (1913)

p. 130; BAILEY, Compr. Cat. Queensl. Pl. (1913) p. 229; WIGMAN, in VAN GORKUM, O.I. Cult., 2 (1913) p. 883; BOLDINGH, Zakfl. Landbouwstr. Java (1916) p. 174; HEYNE, Nutt. Pl. Ned. Ind., ed. 1, 3 (1917) p. 400; MERRILL, Enum. Phil. Fl. Pl., 3, p. 239 (1923); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1284, ic. 2484—2486, t. 200, 1 (1926); HEYNE, Nutt. Pl. Ned. Ind., ed. 2 (1927) 2, p. 1215; DAKKUS, in Bull. Jard. Bot. Buitenz., sér. III, suppl. 1 (1930) p. 142; EWART, Fl. Victoria (1930) p. 908; OCHSE & BAKH., Ind. groenten (1931) p. 712, ic. 432; CRAIB, Fl. siam. enum., 1, p. 790 (1931); VAN STEENIS, in Bull. Jard. Bot. Buitenz., sér. III, 13, t. 3 (1935); BURKILL, Diction. Econ. Prod. Mal. Pen. (1935) 1, p. 1027; *Foeniculum capillaceum* GILBERT, Fl. lithuan. inchoata, coll. IV (1782) p. 40; HIERN, in Fl. Trop. Afr., 3 (1871) p. 3; *Foeniculum officinale* ALLIONI, Fl. pedem., 2 (1785) p. 25; BISSCHOP GREVELINK, Pl. Ned. Ind. (1883) p. 209; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 208 (1898); *Ozodia foeniculacea* WIGHT & ARNOTT, Prodr. (1834) p. 375.

Foeniculum vulgare, originally cultivated, appears to be naturalized on several mountains in eastern Java, e.g. on Mt. Lawoe (after communication by Dr. BACKER) and on Mt. Tengger from Tosari to the Sandsea (after KOORDERS, and HEYNE, ll. cc.).

JAVA. Batavia, JUNGHUHN s.n. (L), cultivated, v.n.: *ahès*; Buitenzorg, HEYNE s.n. (B), cultivated; Salabintana, n. of Soekaboemi, 1000 m el., BACKER 26532 (B), cultivated; Lemah Goenting, nr. Bandoeng, DOCTERS VAN LEEUWEN s.n. (B), cultivated; G. Tjikoerai, BURCK 391 (B); Sadang, OCHSE s.n. (B), cultivated, v.n.: *hades*; Diëng Plateau, 2050 m el., BACKER 21899 (B), cultivated, v.n.: *adas*; G. Merbaboe, JUNGHUHN l.c.; Wanasari, VAN SLOOTEN 2366 (B); Sepakoeng, 1000 m el., KOORDERS 36322 β (B), cultivated, v.n.: *adas*; Bajalali, BEGUIN s.n. (B); G. Lawoe, above Maospati, 500 m el., BACKER 4670 (B), cultivated; 1600 m el., DORGEOLO (after communication by Dr. C. A. BACKER); Lebaksari, near Poedjon, 800 m el., cultivated, VAN STEENIS 2619 (B); G. Ardjoena, 3300 m el., KOORDERS 43789 β (B), v.n.: *adas*; Malang, cultivated, OCHSE s.n. (B); G. Tengger, Tosari, 1700 m el., BACKER 8356 (B); above Tosari, 1800—2000 m el., BACKER & POSTHUMUS s.n. (B); Tosari, Moenggal, Penandjaan, 1800—2500 m el., KOBUS s.n. (B), v.n.: *adas*; Ngadisari, 2000 m el., KOORDERS 37876 β (B, L), v.n.: *adas*; between Tosari and Ngadisari, WENT s.n. (L); S.W. Tengger, 1800—2400 m el., BEUMÉE A632, v.n.: *nadar*; G. Bromo, RANT s.n. (B).

TIMOR. Cultivated, REINWARDT (?) s.n. (L).

SELEBES. Tondano, cultivated, FORSTEN s.n. (L).

BANDA. coll. ? (L), v.n.: *adas manis*.

Distribution: indigenous in the Mediterranean region, cultivated throughout the world (THELLUNG l.c.).

XIX. ANETHUM

LINN., Sp. pl., ed. 1 (1753) 1, p. 263; Gen pl., ed. 5 (1754) p. 127; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 208 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1290 (1926); *Peucedanum* sect. *Anethum* BENTH. & HOOK.F., Gen. pl., 1, p. 919 (1867).

Only species:

1. *Anethum graveolens* LINN. — Annual herb. Stems 50—100 cm high, terete, striate. Leaf-sheath rather short, 1.5—2 cm in the lower leaves, shorter in the upper leaves, white-margined, with cucullate-conate auricles at the apex; lamina tri-pennate with filiform segments. Compound umbels terminal to the stem and the branches; peduncles 4—13 cm long, umbel-rays 5—15 in number, 2—4 cm long; pedicels 5—25 in number, 0.5—1 cm long; involucre and involucels none. Calyx teeth none; petals yellow, strongly curved inward. Mericarps oblong, nearly 5 mm long, 3 mm broad, moreover with a wing 0.25—0.5 mm broad.

Anethum graveolens LINN., Sp. pl., ed. 1 (1753) 1, p. 263; D. C., Prodr., 4 (1830) p. 186; HASSKARL, Cat. Pl. Hort. Bot. Bogor. (1844) p. 164; MIQUEL, Fl. Ind. Bat., I, 1, p. 743 (1856); TEYSMANN & BINNEND., Cat. Pl. Hort. Bot. Bogor. (1866) p. 166; FILET, Plantk. Woordenb. (1876) p. 1; BAKER, Fl. Maurit. & Seych. (1877) p. 133; BISSCHOP GREVELINK, Pl. Ned. Ind. (1883) p. 210; MASSART, in Mém. Soc. Bot. Belg., 34, p. 203, 324 (1895); DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 208 (1898); DE CLERCQ, Plantk. Woordenb. (1909) p. 168; KOORDERS, Exkursionsfl. Java, 2 (1912) p. 730; HEYNE, Nutt. Pl. Ned. Ind., ed. 1, 3 (1917) p. 400; CHERMEZON, in LEC., Fl. Indo-Ch., 2, p. 1152, ic. 136, 9 (1923); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1291, ic. 2307b, 2487, 2488 (1926); HEYNE, Nutt. Pl. Ned. Ind., ed. 2 (1927) 2, p. 1215; OCHSE & BAKH., Ind. groenten (1931) p. 695, ic. 423; CRAIB, Fl. siam. enum., 1, p. 791 (1931); BURKILL, Diction. Econ. Prod. Mal. Pen., 1, p. 158 (1935); *Anethum Sowa* D. C., Prodr., 4 (1830) p. 186; ROXBURGH, Fl. Ind., ed. CAREY (1832) 2, p. 96; WIGHT & ARN., Prodr. (1834) p. 372; WIGHT, Icones, 2, t. 572 (1843); ROXBURGH, Fl. ind., ed. CLARKE (1874) p. 272; CRAIB, Fl. siam. enum., 1, p. 791 (1931); *Peucedanum graveolens* HIERN, in Fl. Trop. Afr., 3 (1871) p. 19; CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 709 (1879); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 622; HAYATA, Mat. Fl. Formosa, p. 130 (1911); Ic. pl. Formos., 2 (1912) p. 57; WIGMAN, in VAN GORKUM, O.I. Cult., 2 (1913) p. 883; VAN DONGEN, Overz. Geneesmidd. Ned. Ind. (1913) p. 130; EWART, Fl. Victoria (1930) p. 905.

SUMATRA. Palèmbang, Moearadoea, 250 m el., in native gardens, GRASHOFF 418 (B), vn.: *adas*; Lampongs, G. Raté Berenong, 400 m el., IBOET 266 (B, L).

JAVA. Batavia, 10 m el., coll.? (B), v.n.: *adas*, cultivated; BACKER s.n. (B); HEYNE s.n. (B); between Batavia & Meester Cornelis, cultivated, BACKER s.n. (B); Buitenzorg, 250 m el., BACKER s.n. (B); Sindanglaja, cultivated, OCHSE s.n. (B); Tjipanas nr. Sindanglaja, 1050 m el., BACKER 21503 (B); G. Goentoer, cultivated in the garden of Hotel Kamodjan, after oral communication by Prof. DANSER, Groningen; also cultivated in the mountains of E. Java, after oral communication of Prof. J. KUYPER, Groningen.

MADOERA. Pegantènan, cultivated, VORDERMAN 97 (B), v.n.: *adas*.

SOEMBA. Mengiliwai nr. Maomarroe, IBOET 432 (B, U), v.n.: *walahandji*.

TIMOR. Collector? „ex Herb. Paris” (K), imperfect specimen.

NEW GUINEA. Merauke, KOCH s.n. (B, L), v.n.: *djinten*, mentioned by VALETON, in Bull. Agr. Ind. Néerl., 10 (1907) p. 43, as *Foeniculum vulgare*.

Distribution: wild in S. and S.W. Asia, cultivated in most parts of the world (after THELLUNG, l.c.).

XX. PASTINACA

LINN., Sp. pl., ed. 1 (1753) p. 262; Gen. pl., ed. 5 (1754) p. 126; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 238 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1404 (1926).

Only species:

1. **Pastinaca sativa** LINN. — Biennial herb. Primary root fusiformis. Stems angular and strongly grooved. Leaves pennate, the leaflets 2—13 cm long, 1—5 cm broad, oblong-ovate, often 3-lobate to 3-partite, irregularly crenate. Inflorescences terminal to the stem and its branches; peduncles 3—7 cm long; umbel-rays 5—12 in number, 1—4 cm long; pedicels 10—20 in number, 2—7 mm long; involucre and involucels none or 1—2-leaved. Calyx teeth none; petals yellow, with inflexed tip. Mericarps nearly 5—7 mm long, 4—5 mm broad, broad-elliptical, the marginal wing 0.25—0.5 mm broad inclusive. (Description after European materials.)

Pastinaca sativa LINN., Sp. pl., ed. 1 (1753) 1, p. 262; D. C., Prodr., 4 (1830) p. 188; BENTHAM, Fl. austr., 3 (1866) p. 336; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 238 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1405, ic. 2435b, 2542—2544, t. 203, 2 (1926); BURKILL, Diction. Econ. Prod. Mal. Pen., 2, p. 1677 (1935).

JAVA. Salabinta above Soekaboemi, 900 m el., cultivated, BACKER 22156 (B).

Distribution: spontaneous in Europe and temperate Asia, cultivated and subspontaneous elsewhere (THELLUNG l.c.).

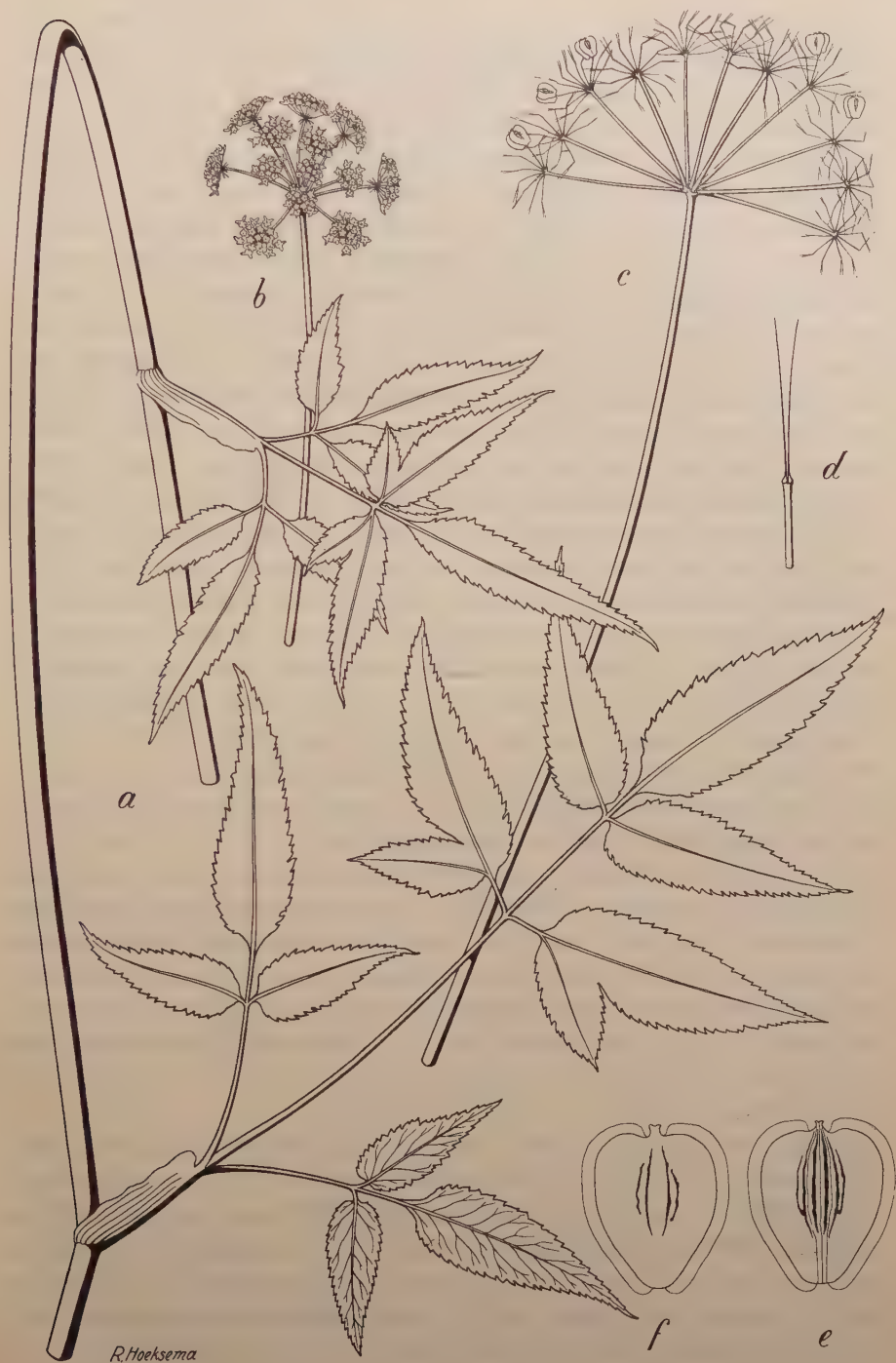
XXI. HERACLEUM

LINN., Sp. pl., ed. 1 (1753) 1, p. 249; Gen. pl., ed. 5 (1754) p. 118; BENTHAM & HOOKER FIL., Gen. pl., 1, p. 921 (1867); DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 239 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1415 (1926).

Only species:

1. **Heracleum sumatranum** BUWALDA n. sp. — **Fig. 6.** — Caulium pars inferior ignota, partes quae exstant ad 80 cm longae, prope basin ad 6 mm crassae, probabiliter erectae, teretes, striatae vel leviter sulcatae, basin versus glabrae, apices versus magis vel minus hirsutae, pilis ad 0.5 mm longis, nodis nonnihil incrassatis, internodiis inferioribus 20—55 cm longis, superioribus gradatim breviores et minus crassis. Folia sparsa, inferiora ignota, media (inferiora partium quae exstant) rosulas minores in axillis ferentia, sessilia in vaginis ad 40 mm longis 15 mm latis amplexicaulibus margine membranaceis apice auriculatis vel in petiolum brevissimum attenuatis; folia inferiora biternata foliolo apicali tripartito vel ternato, circuitu deltoidea, ad 20 cm longa 28 cm lata, foliolis primariis longe petiolulatis petiolulo folioli primarii terminalis 10 cm longo lateralium 3.5 cm longo, petiolulis foliolorum secundariorum et tertiariorum gradatim brevioribus, ultimorum terminalium 1 cm longis, lateralium nullis; folia superiora gradatim minus composita, suprema ternata; foliola foliorum caulinorum oblongo-ovata longiusecule acuminata, terminalia oblongiora quam lateralialia, ad 8 cm longa 3 cm lata, foliorum superiorum etiam angustiora, omnia serrata subbiserrata, dentibus breve acuminatis apiculatis 1—2 mm longis 2—5 mm latis, facie superiore subglabra, inferiore nervis tenuiter hirsutis; folia rosularum axillarium probabiliter ut basalia sed minora et minus composita, petiolo lamina breviora, subbiternata, foliolis latioribus. Pedunculi inflorescentiarum 10—20 cm longi, ceterum ut caules; involucra nulla, involucella bracteis lanceolatis, longe acuminatis, 6—7 mm longis, c. 0.5 mm latis, paulum hirsutis, margine angusto membranaceo; radii umbellae 9—12, tempore florendi 1.5—3 cm longi, sulcati, breve hirsuti, postea 4—6 cm longi, magis divaricati, denique subreflexi; pedicelli ad 20 in quaque umbellula, tempore florendi 2—5 mm longi, tenuiter denseque hirsuti, postea 8—12 mm longi, gradatim magis divaricati vel etiam reflexi. Ovarium 0.75 mm longum et

Fig. 6. — *Heracleum sumatranum*, after BÜNNEMEIJER 2629; a: stem with leaves, b: inflorescence, and c: fruit-bearing inflorescence, all $\frac{1}{2} \times$; d: pedicel with carpophore; e: mericarp seen from the outside; f: mericarp seen from the inside, all $3 \times$.



R. Hoeksema

Fig. 6 — *Heraclium sumatranum* (cf. p. 204, bottom).

latum; calycis dentes inconspicui, flores marginales autem saepe dente singulo prolongato ad 1.25 mm longo; petala florum centralium elliptica ad obovata, ad 1.5 mm longa 1 mm lata, apice angusto inflexo ad 1 mm longo, florum marginalium radiantia, exteriora late obcordata, ad 3 mm longa 4 mm lata; filamenta c. 2.5 mm longa; antherae c. 0.75 mm longae 0.5 mm latae; styli tempore florendi c. 0.3 mm longi, postea ad 1 mm longi, denique decidui; stylopodium tempore florendi planum, postea conicum ad 1 mm altum. Mericarpia circuitu rotundato-obovata, 6.5—8 mm longa, 5.5—7 mm lata, glaberrima, margine ala tenui membranacea c. 2.5 mm lata, corpore elliptico apice basique acuto 3—4 mm longo 2 mm lato, jugis dorsalibus 3 parte media latiusculis vittis angustis tantum separatis, parte apicali et basali tenuibus parallelis, jugis marginalibus remotis ad 0.5 mm a margine currentibus, vittis omnibus transverse septatis, facie exteriori 6, 2 inter juga dorsalia seminis corpore fere aequilongis, apice basique acutis, utroque latere jugorum dorsalium binis, quarum interiores seminis corpore aequilongae, exteriores plerumque apice basique breviores, liberae acutae vel cum interioribus confluentes et obtusae, facie interiore (commissura) carina indistincta obtusa mediana vittisque 4, quarum interiores minus quam 1 mm remotae, seminis corpore aequilongae, exteriores interioribus proximis et parallelis, plerumque dimidio breviores; carpophorum tenue, usque ad basin bifidum.

Heracleum sumatranum BUWALDA, ex VAN STEENIS, in Bull. Jard. Bot. Buitenzorg, sér. III, 13, p. 255 (1934) nomen.

There is some difficulty about the question, whether our plant is a *Heracleum*, a *Pastinaca*, or a *Peucedanum*.

According to BENTHAM and HOOKER (Gen. pl., 1, p. 870, 871, 918—921), it certainly is either a *Peucedanum* (this genus including *Pastinaca*), or a *Heracleum*. Between these two genera there appear to exist no constant characters, but because of the radiating flowers, the hirsute indumentum, the rather broad leaflets, the broad mericarps, the vittae, especially the lateral ones, not prolonged down to the base of the fruit, and the hairy ovary, our plant is rather a *Heracleum* than a *Peucedanum*.

After the characters given by DRUDE (in ENGLER and PRANTL, Nat. Pflanzenfam., III, 8, p. 115), we cannot state whether our plant belongs to the *Ferulinae* or to the *Tordyliinae*, as only detached mericarps are available. In the former case it would be a *Pastinaca*, in the latter a *Heracleum*. The differences, indicated for the distinction for *Pastinaca* and *Heracleum*, are slight, but on the same arguments as enumerated above one should conclude that our plant is a *Heracleum*.

According to THELLUNG (in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1405), *Pastinaca* is more closely allied to *Heracleum* than to *Peucedanum*, and *Pastinaca* differs from *Heracleum* by non-radiating flowers and transversely septate vittae, whereas *Heracleum* often has radiating flowers and always non-septate vittae. Now our plant has radiating flowers, but distinctly septate vittae, so that a decision based on these characters appears difficult. I found, however, distinctly septate vittae also in *Heracleum Wallichii* D.C. in the Kew Herbarium.

On the ground of the general appearance, the hirsute indumentum, the radiating flowers, and the hairy ovary, I prefer to accept the present new species as a *Heracleum*.

The locality, where our plant has been collected justifies the supposition that it may be a specimen of some species of the Asiatic Continent. Therefore I have tried to identify it with one of the British Indian species of the Kew Herbarium. From these materials appears that none of these species resembles our plant to such a degree, that the latter might be reckoned to it; it even is evident, that those species, to which our plant comes most closely, show less differences than our plant from them all; these species belong to the group enumerated in the Flora of British India from *Heracleum Wallichii* D.C. to *H. barmanicum* KURZ.

As already remarked, the British Indian species show only slight differences, and it seems questionable whether many of these could not better be united to one polymorphic one. The distinction is mainly based on the locality, the dimensions, the colour of the ripe fruit, the leaf shape, and the development of involucels and calyx teeth, all of them very variable in *Heracleum* species. In that case also our species might perhaps better be regarded as a form of such a polymorphic species, but I am not in the condition to settle this question.

SUMATRA. Padang Uplands, G. Singgalang, 2400 m el., BÜNNEMEIJER 2629 (B, L), flowers white.

XXII. DAUCUS

LINN., Sp. pl., ed. 1 (1753) 1, p. 242; Gen. pl., ed. 5 (1754) p. 113; BENTH., Fl. austr., 3 (1866) p. 376; BENTHAM & HOOK.F., Gen. pl., 1, p. 928 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 718 (1879); BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 623; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 248 (1898); THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1501 (1926).

Only species:

1. **Daucus Carota** LINN. — Annual, biennial or perennial herb. Primary root fusiformous. Stems erect, striate or grooved, hirsute. Leaves 2—3-pennatipartite with lanceolate segments. Compound umbels with flat or rounded surface when flowering, with incurved peduncles and pedicels and hollow surface when fruiting; peduncles 2—25 cm long; umbel rays 15—30 in number, 1—6 cm long; pedicels 20—30 in number in each umbelule, 0.5—1.5 cm long; involueral leaves 3—5 cm long, pennatipartite, white-margined towards the base; involucels 5—7-leaved, the leaves entire to pennatipartite, lanceolate, 0.5—2 cm long. Calyx teeth triangular, acute, 0.25—0.5 mm long. Petals in all flowers white, or dark-red in 5—7 central sterile flowers of the middle-umbel, with inflexed tip, the peripheric ones of the inflorescence radiating. Mericarps nearly oblong, 3 mm long, 1.5—2 mm broad, the primary ribs filiformous with rather few nearly 0.25 mm long fine bristles, the secondary ribs beset with nearly 1 mm long rigid bristles. (Description after Javan and European specimens.)

Daucus Carota LINN., Sp. pl., ed. 1 (1753) 1, p. 242; D. C., Prodr., 4 (1830) p. 211; WIGHT & ARN., Prodr. (1834) p. 374; HASSKARL, Cat. pl. Hort. Bot. Bogor. (1844) p. 164; MIQUEL, Fl. Ind. Bat., I, 1, p. 743 (1856); TEYSMANN & BINNEND., Cat. pl. Hort. Bot. Bogor. (1866) p. 166; BENTHAM, Fl. austr., 3 (1866) p. 377; MIQUEL, Ill. Fl. Arch. Ind. (1871) p. 43; HIERN, in Fl. Trop. Afr., 3 (1871) p. 25; FILET, Plantk. Woordenb. (1876) p. 10; BAKER, Fl. Maurit. & Seych. (1877) p. 133; CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 718 (1879); BISSCHOP GREVELINK, Pl. Ned. Ind. (1883) p. 212; BOERLAGE, Handl. Fl. Ned. Ind., I, 2 (1890) p. 624; KOORDERS, Versl. Dienstr. Minah. (1898) p. 488; DRUDE, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 249 (1898); KOORDERS, Exkursionsfl. Java, 2 (1912) p. 730; WIGMAN, in VAN GORKUM, O.I. Cult., 3 (1913) p. 696; HEYNE, Nutt. Pl. Ned. Ind., ed. 1, 3 (1917) p. 401; OCHSE, Trop.-groenten (1925) p. 185, ic. p. 188; THELLUNG, in HEGI, Ill. Fl. Mitteleur., V, 2, p. 1508, ic. 2576—2583, 2575d, t. 204, 2 (1926); HEYNE, Nutt. pl. Ned. Ind., ed. 2 (1927) 2, p. 1216; EWART, Fl. Victoria (1930) p. 902; DAKKUS, in Bull. Jard. Bot. Buitenz., sér. III, suppl. 1 (1930) p. 96; OCHSE & BAKH., Ind. groenten (1931) p. 708, ic. 430; VAN STEENIS, in Bull. Jard. Bot. Buitenz., sér. III, 13, p. 345, t. 3 (1935); BURKILL, Diction. Econ. Prod. Mal. Pen., 1, p. 772 (1935).

Daucus Carota, originally introduced in Java as a vegetable, appears to be naturalized in some localities in the mountains, e. g. near Rarahan, on Mt. Gedé, and on Mt. Tengger, near Tosari, where it grows, just like in Europe, among the grass along road sides.

SUMATRA. Cultivated near Berastagi and Pematang Siantar, brought at the market in Médan (after oral communication by Prof. J. KUYPER, Groningen).

JAVA. Without exact locality, WAITZ s.n. (L); cultivated, HASSKARL s.n. (B); Batavia, cultivated, BACKER s.n. (B); Buitenzorg, cult., SMITH s.n. (B); Tjipanas, Tjibodas, cult., 1300 m el., VAN STEENIS 1809 (B); nr. Rarahan above Sindanglaja, 1300 m el., DANSER 6022 (G), growing wild; Semarang, brought upon the market from the mountains, MULLER, Nat. & Geneesk. Arch. Ned. Ind., 2, p. 465 (1845); G. Tengger, above Torari, 1800 m el., BACKER 8377 (B); 1700—1800 m el., BACKER s.n. (Pa), along paths among the grass.

TIMOR. Cultivated and subspontaneous, after MIQUEL, l. c.

Distribution: spontaneous in Europe, N. Africa, and temperate Asia, cultivated in all parts of the world (THELLUNG, l. c.).

Species dubia.

Hydrocotyle azurellacea F. v. MUELLER, in Journ. Bot., 31, p. 324 (1893). This species is mentioned without description as a new species, collected with other plants by Sir W. MACGREGOR on the summit of the Owen Stanley's Range. It is incidentally typified with the following words: „a new *Hydrocotyle* (*H. azurellacea*), much resembling a *Huanaca* in habit”.

Species excludendae.

Bifora testiculata (LOUREIRO) HOFFMANN — MIQUEL, in Fl. Ind. Bat., I, 1, p. 744 (1856), mentions *Atrema testiculatum* Miqu., = *Coriandrum testiculatum* LOUREIRO, = *Bifora Loureiri* KOSTELETZKY, as probably occurring in Java and the other Sunda Islands, and this supposition is taken over by BOERLAGE, in Handl. Fl. Ned. Ind., I, 2 (1890) p. 623, under the right name *Bifora testiculata* HOFFMANN. As far as known, no specimens of this species have ever been met with in Java, neither cultivated nor wild, and MIQUEL's supposition that the plants mentioned by MOLKENBOER in the Plantae Junghuhnianae under *Coriandrum sativum*, but with the remark „involucro involucellisue multifidis et umbellâ 6—8-radiata”, might be this species, is incorrect as well.

Conium maculatum LINN., perhaps found subspontaneous in the Netherlands Indies according to BOERLAGE (Handl. Fl. Ned. Ind., I, 2, p. 616), in reality has never been found there.

Hydrocotyle villosa KOORDERS, in Teysmannia, 11, p. 252 (1901), probably is a writing mistake for some other common species. The true *H. villosa* LINN.FIL. is a native of South Africa.

ERRATUM.

On page 130, line 12 from bottom, before the name ZOLLINGER, the name *Hydrocotyle latisepta* must be inserted.

Index of herbarium numbers,

referring to the species by means of their genus number and, if necessary,
their species number.

AJOEB (exped. JACOBSON) 439=IV.

ALTMAN 64=I,1; 192=XVI,2.

ALVINS 1612=V.

AMDJAH (exped. NIEUWENHUIS) 278,
289=I,1.

ANDERSON 190=XVII.

ANONYMUS 12=II.

ARENS s.n. =I,1 (2X).

ARENS & WURTH s.n. =IV.

ARSIN s.n. =XIII,2.

BACKER s.n. =II, III,14, IV, XIII,2,

XIX(3X), XXII(3X); 6=V;

74=I,2; 116, 160=V; 178=IV;

432=I,2; 433=I,1; 436, 514=IV,

592=V; 659=II; 1074=V; 1119=

XVI,3; 1190, 1289, 1466=V;

1622=II; 1664, 1830=V; 1924=

II; 2039, 2224=V; 2421=IV;

2456, 2800=II; 2841, 2920, 3090=

V; 3180=VIII; 3208, 3252=IV;

3566=I,2; 3593, 3610=IV; 3634=

I,1; 3786=II; 4294=V; 4473=

XVII; 4670=XVIII; 4768=V;

4819=IV; 4883=XVII; 5042=II;

5169=V; 5296=I,2; 5335=IV;

5471=II; 5491=I,1; 5590=II;

5640=IV; 5719=V; 5842=XIII,2;

5940=I,1; 6729=IV; 6745=I,1;

6790, 7265=V; 7379=IV; 8117=

II; 8356=XVIII; 8358-bis=VII;

8377=XXII; 8382=XVI,2; 8395=

I,2; 8470=V; 8624=IV; 8635=

XVII; 8667=II; 8927=I,1; 9042=

V; 9495=XIII,2; 9570=XVII;

9648=I,2; 9761=IV; 10336=V;

10421=I,1; 10488=II; 10695=I,1;

10822=XVII; 10872=IV; 11116=

V; 11143=II; 11362=I,1; 11589=

XVI,2; 11590=IV; 11881=I,2;

12205=IV; 12277=XVII; 12327,

12543=II; 12710=XVII; 12739=

II; 12767=I,1; 12815=I,2; 12824=

II; 13191=IV; 13225=I,1; 13331

=XVI,3; 13542, 13650=XVII;

13949=V; 14124=IV; 14223=II;

14227=I,2; 14239=XIII,2; 14391,

14546=V; 14566=I,2; 14591=II;

14715, 14939=IV; 15364=V;

15447=XIII,2; 15615=V; 15714=

XVII; 15726=V; 15798=XVII;

15892=I,1; 15906=IV; 15917=

I,2; 15932=II; 15958=XVII;

15960=V; 16111=I,1; 16118=I,2;

16447, 16924=V; 16996=II; 17073

=V; 17211=II; 17230, 17380, 17719

=V; 18200=II; 18428-bis=V;

18658=IV; 18697=II; 19822, 20289

=XIII,2; 21041=XII; 21503=

XIX; 21569=V; 21601=IV; 21621

=II; 21691=XVII; 21697=I,2;

21741=XVI,3; 21874=XI,1; 21899

=XVIII; 21909=XVII; 21976=

IV; 21989=V; 22042=XIII,2;

22156=XX; 22366=XVII; 22374

=IV; 22379=I,1; 22712=V; 22793

=VIII; 23422=I,1; 23629=V;

24166=XIII,2; 24909=I,1; 25047

=XVII, 25069, 25338=I,2; 25364

=IV; 25375, 25595=I,1; 25676=

XII; 25760=V; 26093=XVII;

26109=II; 26532=XVIII; 29186=

I,2; 30110=II; 30254=IV; 30732

=I,1; 30895=IV; 31180=I,1;

31295=IV; 31382=XVII; 31916,

31917=IV; 31918, 31919=I,1;

32080, 32081, 32082, 32083=II;

32130, 32131, 32132, 32134, 32135,

32136, 32137, 32138=V; 32150,

32151=I,2; 34390, 34391=VIII.

BACKER & BREMEKAMP 9824=XVI,2.

BACKER & POSTHUMUS s.n. =XVI,2,
XVIII.

BAKHUIZEN VAN DEN BRINK 27, 266=II;

271=I,1; 272=I,2; 422=II; 826=

I,1; 1802=II; 1854=XVII; 1867,

2056, 2138, 2421=IV; 2497, 2611=

- XVII; 2830, 3658=I,1; 4359=IV;
4389=V; 4661=IV; 4659=I,1;
5549=I,2; 6605=XVII; 6700=
I,2; 6801=XIII,2; 7010, 7011=I,2;
7412=VIII.
- BALLY s.n. = XVI,2.
BARENDs s.n. = V.
BARTLETT s.n. = II.
BECCARI P.S. 331=IV; 623=I,1.
BEGUIN s.n. = XVIII; 73, 313, 625=II;
1781=XIII,2.
BEUMÉE 6D, 4300=II; 4809=V; A120
=IV; A452=XVII; A632=XVIII.
BLAKELY s.n. = III,1.
BLOKHUIS s.n. = IV, XVII.
BLUME s.n. = I,1(2×), I,2, II(2×),
IV(2×), XVII.
BOERLAGE s.n. = I,1, I,2, II(2×), IV
(2×), V(2×), XVII(2×); 108=
I,2.
BRANDERHORST 146=III,2; 251=II.
BRASS 4150=XVII; 4177=III,13; 4244
=III,1; 4307, 4358, 4404=IX,3;
4475=I,2; 4513=III,13; 4670=I,2;
4671=III,1; 4753=IX,3; 4898=
I,2; 5005=I,1; 5334=XVII; 5682
=IX,3.
BREMELKAMP (cfr. also BACKER & BREME-
KAMP) s.n. = I,1, IV, XVI,2, XVI,3.
BRINKMAN 268=IV; 278=II; 321=I,1;
322=I,2.
BÜNNEMEIJER 839, 2579=IV; 2629=
XXI; 2659, 3562=IV; 3778=I,1;
3790=IV; 4575=I,1; 4586, 5018=
IV; 5162=I,1; 5544=IV; 5667=
XVII; 7932=II; 7956=V; 8115=
II; 8186=IV; 8723=XVII; 8794
=IV; 8984=XVII; 9112, 9202=
IV; 9464, 9607=XVII; 9664=IV;
9724=XVII; 9783, 9960, 9986,
9987, 9988=IV; 10001=I,1; 10166
=IV; 10411=I,1; 10414, 10526=
IV; 10990=I,1; 11639=I,2; 11898
=III,7; 11910=I,2; 12170=III,7;
12372, 12586=I,1.
BURBIDGE s.n. = III,1.
BURCK s.n. = I,1, I,2; 127=XVII;
391=XVIII; 510=I,1; 532=IV;
586=XVII.
BURKILL 12=IV; 73=I,1; 104=XVII;
761=XI,2; 3051=V; 8156=IV;
8252=I,2; 13902=I,1.
BURKILL & HANIFF 12375=II; 12446=
V; 12912=I,1; 12915=I,2; 13740,
13966, 16799=II.
BÜSGEN 201=XVI,2.
BUYSMAN 98=II; 403=I,1; 3009=IV.
CANTLEY's collector s.n. = V, XIII,2.
CLASON 130=IV; 164=I,1; A69=I,2;
A70=II; E20=I,2; G9=XVII;
G39=IV.
CLEMENS s.n. = I,1(2×), IV, IX,1;
10330=IV; 10522, 10538, 10563,
10612=III,1; 10622=IX,1; 21268
=I,2; 21269=II; 22309=I,2;
26382=I,1; 27098=III,1; 29725=
IV; 29809=IX,1; 30058=III,1;
30682=IV; 30684, 32597=I,1;
33164=III,1; 33729=I,1; 33735=
III,1; 34031=IV.
COSTER 99=I,1.
CURTIS (cfr. also RIDLEY & CURTIS) s.n.
=I,1, V(2×), 1752=I,2; 1885=II;
2086=I,1; 3407=XI,2.
DANSER 5361=V; 5405=I,2; 5511=II;
5720=IV; 5953=XVII; 6022=
XXII; 6145=IV; 6628, 6806=I,1;
6883=V.
DE BEYER 93=IV.
DE MONCHY s.n. = I,1; II, IV.
DEN BERGER 596=IV; 623=XVII; 702
=IV.
DENKER 79=IV; 92=I,1.
DE VISSER SMITS s.n. = I,1, IV.
DE VOGEL s.n. = I,2, II.
DE VOOGD s.n. = XVI,2; 35=I,1; 41=
IV; 115=XVII; 171, 172=I,1;
506=IV; 1407, 1851=XVII; 2299
=IV; 2300=III,9.
DE VRIES 8=V.
DOCTERS VAN LEEUWEN s.n. = I,1(3×),
I,2, II(2×), IV(2×), V(2×),
XVI,2(4×), XVII, XVIII; 175,
198=XVII; 463=I,2; 1137=I,1;

- 1166=XVI,2; 2256=I,2; 2259=XVII; 3360=XVI,3; 3731=II; 4540=IV; 4562=XVI,2; 4566=VII; 4575=XVI,3; 4583=I,2; 5586, 5729, 8360=XVI,3; 8964=IV; 9723=XVII; 9744=II; 9904, 10735=XVII; 10790=I,1; 11454=I,2; 12209=XVI,2; 12217=XVI,3; 12274=IV; 12355=XVI,3; 12426, 12456=XVI,2; 12714=I,1; 13146, 13171, 13173=XVI,3; 13337=I,2.
- ECOMA VERSTEGE s.n. = XVI,3.
- EDELING s.n. = II.
- ELBERT 301=IV.
- ENDERT 2890, 3256, 4539=I,1.
- EVERETT 33=IV; 73, 74=III,7.
- FORBES 673=II; 820=IV; 936=I,1; 1020, 1952, 2402=IV.
- FORSTEN s.n. = VIII, XVIII; 78, 885=XVII.
- FOXWORTHY cfr. NUR & FOXWORTHY.
- FREY-WYSSLING 129=IV; 145=I,1.
- GIBBS 3038=I,1; 4150, 4184, 4221, 4310=III,1; 5513=III,10; 5606=III,3; 5650=I,1; 5943=I,3.
- GIULIANETTI s.n. = III,1, III,2, IX,3 (2×), XVII.
- GJELLERUP 76=II; 1039=I,2; 1087, 1128=III,10.
- GORDON SPARE 877=II.
- GRASHOFF 395=XIII,2; 418=XIX; 446=XIII,2; 472=XVII; 530=V; 541=VIII.
- HAGEDOORN & JESWIET s.n. = V.
- HAGEN s.n. = VII, XVII.
- HALLIER s.n. = I,1, IV; 72=IV; 127a, b=II; 128a,b,c,d=I,2; 129a=I,1; 130a,b,c,d=V; 146=I,2; 237=II; 240=I,2; 380=XVII; 438=IV; 439=XVII.
- HAMID 10259=V.
- HANIFF 4005, 4026=I,1; 15622, 16265=II.
- HARMSSEN 96=II.
- HASSKARL s.n. = XVII, XXII; 131=I,1, I,2, IV.
- HAVILAND 1130, 1162=III,1; 1273=I,1; 2045=II.
- HEINRICH 265=III,9.
- HELLWIG 357, 633=I,1.
- HENDERSON 10953=IV; 11029=I,1; 11033=IV; 17931, 19548=I,1; 20247=XVII; 22217=I,1.
- HEYNE s.n. = XII, XIII,2, XVIII, XIX.
- HILLEBRAND s.n. = I,2, II, IV(2×), V, XVII.
- HOEDT s.n. = I,1.
- HOFSTEE 3=II; 14=V; 29=I,2.
- HOLTUM s.n. = I,1; III,1, XVII; 15456=XVII; 24585=II.
- HORSFIELD s.n. = I,2, XVI,3, XVII; 418=XVII.
- HUTTEMA 13=II.
- HULLETT s.n. = IV.
- HUME 8813=I,1; 8965=V; 9436=II.
- IBOET 27=I,1; 266, 432=XIX.
- JACOBSON (cfr. also AJOEB) 108, 2057=II.
- JAGOR s.n. = IV; 34=II; 379=IV; 684=I,2.
- JENSEN 229=II.
- JESWIET (cfr. also HAGEDOORN & JESWIET) s.n. = XVI,2; 479=IV; 569=I,1; 598=XVI,2.
- JUNGHUHN s.n. = I,1(4×), I,2(3×), II, IV(8×), XIII,2, XVI,2(8×), XVI,3(3×), XVII(4×), XVIII.
- KARTA 15=I,1.
- KEUCHENIUS s.n. = IV, V.
- KEYSSER s.n. = III,11.
- KING's collector 8197=I,1.
- KJELLBERG s.n. = I,2; 916=II; 1009=I,2; 1153=II; 1424=I,2; 1425=II; 1432=I,2; 1541=IV; 1697=I,1; 1723=I,2; 3884=III,5; 3885=III,6; 3886=III,9; 3887=I,2.
- KLEINHOONTE 648=I,1.
- KLOSS (cfr. also ROBINSON & KLOSS) s.n. = I,1, IX,1; XVII(5×).
- KOBUS s.n. = I,2; VII, XVI,2, XVI,3 (2×), XVIII; 250=II; 258=VII.
- KOCH s.n. = II, XIX.

KOENS 105=V; 116=I,1; 253, 282, 367
=IV; 393=II; 493=V.

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by

EVA BEER & H. J. LAM

(Leiden).

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Mr. BRASS's New Guinea collection has yielded valuable data to our knowledge of the Verbenaceae. He discovered one new genus (*Archboldia*), 3 new species (*Clerodendron Brassii*, *C. populneum* and *Premna inaequilateralis*) and some interesting additions to the area's of earlier described species, among which the rediscovery of *Faradaya chrysoclada*, and the discovery of two species new for South New Guinea (*Premna sessilifolia* and *Teysmannioidendron bogoriense*) and of one more for the whole island (*Glossocarya Hemiderma*).

Archboldia.

(EVA BEER & H. J. LAM in Blumea II; 1936, 31).

A. ericoides E. BEER & H. J. LAM, l. c.

Western Division: Wuroi, Oriomo River, edge of small swamp in savannah forest (nr. 6025).

Endemic shrub about 1 m, with a few erect branches from enlarged stock, branchlets, petioles and underside of midribs purple; fr. very young red, in Jan.—March.

Callicarpa L.

1. **C. longifolia** LAM., forma *subglabrata* SCHAUER — East Asia to Tropical Australia.

Central Division: Dieni, Ononge Road, 500 m in alt. (nr. 3969).

Slender shrub, 2.2—5 m high, common in rain forest; fls. and fr. white, April—May.

2. **C. pedunculata** R. BR. — Formosa, Philippines, East Malaysia to Polynesia.

Central Division: Mafulu, 1250 m in alt. (nr. 5520).

Slender large bush or small tree, common in forest regrowths; fls. pink, fr. bright purple, Sept.—Nov.

3. **C. pentandra** ROXB., var. **Cumingiana** (SCHAUER) BAKH. — Malaysia.

Central Division: Dieni, Ononge Road, 500 m in alt. (nr. 3925); Mafulu, alt. 1250 m (nr. 5537).

Small tree, common in forest regrowth; fls. purple-pink, fr. red, Sept.—Nov. (Mafulu) and Apr.—May (Dieni).

4. **C. tomentosa** (L.) MURR., var. **lanata** (L.) BAKH. — India to New Guinea.

Central Division: Mafulu, 80 m in alt., on forested river bank (nr. 5495); Laloki Riv., Rona, in July, rain forest, alt. 450 m (nr. 3675).

Small slender tree; indumentum reddish brown, lvs. pale softly pubescent, fls. purple-pink, Sept.—Nov.; fr. purple-black, abt. 5 mm in diam., Apr.

Clerodendron L.

1. **C. Brassii** (§ *Tridens*) EVA BEER & H. J. LAM, nov. spec. — *fig. 1* — *Frutex*; *ramuli* glabri i. s. in nodis paulo inflati, internodia quadrangularia, alternatim deplanata; *folia* opposita, membranacea, glabra, late cordata, integra, apice acuminata, circ. 27 cm long, 20 cm lata (1 folium tantum videmus); costa media subtus prominens; nervi secundarii utrinque 9—10, eorum 3 inferiores ad basin conferta, paulo prominentes, recti vel paulo curvati et sinuosi; nervi tertiarum transversa, reticulatione minuta translucentim tantum conspicua; petiolus gracilis 12 cm longus; *inflorescentia* e pedunculo 7 cm longo paniculata, glabra bracteis parvo-foliosis persistentibus 1.5—0.4 × 0.5—0.2 cm, circ. 20 cm longa et lata (vel probabiliter major; unam tantum videmus); pedicelli graciles 0.3—0.4 cm longi; *calyx* glaber membranaceus circ. 1.5 cm longus tripartitus, 2 lobis majoribus apice bidentatis, 0.9—1.2 cm latis, 1 minore integro, 0.5 cm lato; *corolla* glabra exserta, in alabastro late clavato, tubus anguste cylindricus 2.5 cm longus, lobi 5 obovati subpatentes 1.5 × 0.8 cm; *stamina* 4 valde exserta, glabra, gracilia, 6—7 cm longa, corollae fauce inserta, antheris parvis, 0.25—0.35 cm longis; *stylus* filiformis exsertus, 6 cm longus, stigmate bifido; *ovarium* glabrum 4-sulcatum,

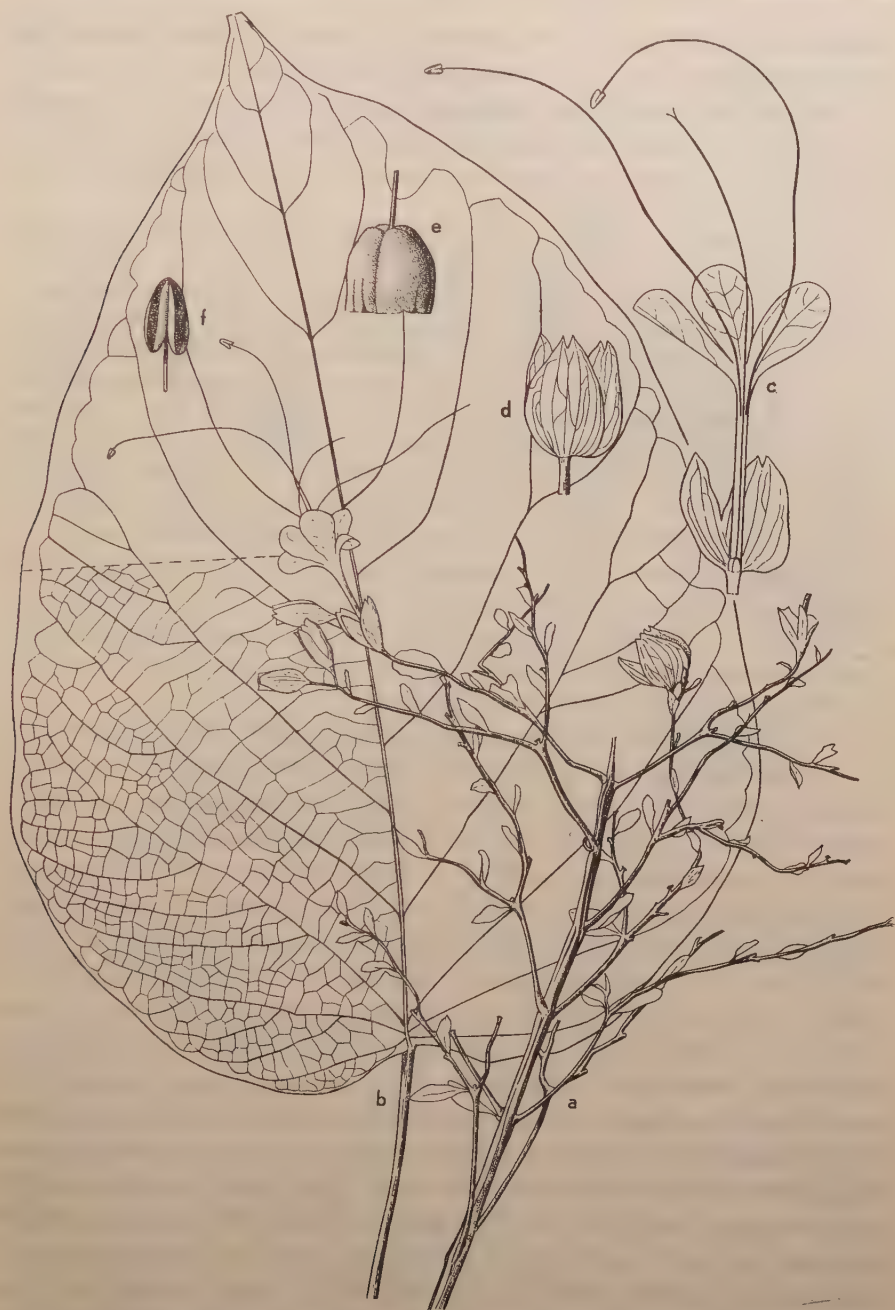


Fig. 1 — *Clerodendron Brassii*, nov. spec. — a. inflorescence; b. leaf; c. longitudinal section of flower; d. calyx; e. ovary and base of style; f. anther, ventral side — after type specimen.

imperfecte 4-loculatum, ovula anatropa 4, placentis parietalibus affixa: fructus ignoti.

Central Division: Dieni, Ononge Road, fairly common on roadside regrowths, alt. 500 m (nr. 3867, *type specimen*).

A soft-wooded shrub up to 2 m tall; branches, leaf nerves and petioles purple; fls. brownish red in April—May.

Named in honour of Mr. L. J. BRASS, who yielded so many valuable contributions to our knowledge of the Papuan flora.

The present species is a characteristic representative of the section *Tridens*, thusfar only known from the Lesser Sunda Islands by two species: *C. Elberti* HALL.F. and *C. Hettae* HALL.F. This is the more remarkable since this section, especially *C. Hettae*, shows in its calyx and corolla some relations to *Faradaya*, a typical eastern genus (N. Borneo, Taland, Moluccas, New Guinea, Australia, Polynesia). This taxonomical relation is now geographically confirmed. All three species are closely allied; *C. Brassii* differs from *C. Elberti* only in some minor points (bidentate calyx lobes, broader petals); from *C. Hettae* it is distinguished by much smaller flowers.

2. *C. buruanum* MIQ. — Philippines, Moluccas, New Guinea.

Central Division: Dieni, Ononge Road, 500 m in alt. (nr. 3970); Bella vista, 1450 m in alt. (nr. 5448).

A tall shrub or small tree, common in rain forest. Lvs. dark green above, with impressed nerves, pale below, fls. white, in Apr.—May (nr. 3970) or calyx reddish and corolla cream coloured, in Nov. (nr. 5448).

3. *C. populneum* (§ *Eulerodendron-Axilliflora*) EVA BEER & H. J. LAM, nov. spec. — *fig. 2* — *Frutex*; *ramuli* glabri teretes, i. s. minute striati, laeves; *folia* decussato-opposita glabra, chartacea, longe petiolata acuminato-ovata, e basi lata breviter cuneato-attenuata, integra, apicem versus sensim attenuata, apice longe acuteque acuminata, 9—13 cm longa, 4.5—8 cm lata, petiolo i. s. gracili 2.5—5 cm longo, apicem versus canaliculato et sparse pubescenti; costa media subtus prominula; nervi secundarii e folii basi conspicue trinervi utrinque 6—7, inferiores usque ad $1/2$ vel $2/3$ folii adscendentes, omnes graciles, curvati; nervi tertiarii transversi, vix a reticulatione i. s. paulo prominula distincti; *inflorescentiae* in foliorum superiorum axillis positae, cymosae, pergraciles, glabrae, sine corollis 6—7 cm longae, 3—4.5 cm latae; pedunculi petiolo aequilongi 2.5—3 cm longi, 3—5-plo dichotomae; bracteae mox deciduae lineares basi pilosae; pedicelli gracillimi, 0.8—1 cm longi, cum bracteis nonnullis pilis subrigidis suffulti; *calyx* infundibuliformis 0.5—0.6 cm longus, usque ad $1/2$ vel $2/3$ quinquepartitus, glaber, lacinae subpatentes acute subulatae vel anguste deltoideae; *corolla* glabra, valde exserta, tubo anguste cylindrico 2—2.5 cm longo, 0.1 cm diametro, apicem versus paulo dilatato; petala oblonga, apice rotunda, 0.6—0.8 × 0.25 cm; *stamina* 4, 1.5 cm exserta circ. 2—2.5 cm longa, paulo sub fauce inserta, glabra,

antherae glabrae, i. s. atrae, circ. 0.1 cm longae; *stylus* corollae tubo aequilongus, haud exsertus, filiformis, stigmatе bifido; *ovarium* glabrum, bicarpellatum, paulo sulcatum, imperfecte 4-loculatum, ovula placentis parietalibus (marginalibus) affixa, anatropa; fructus ignoti.

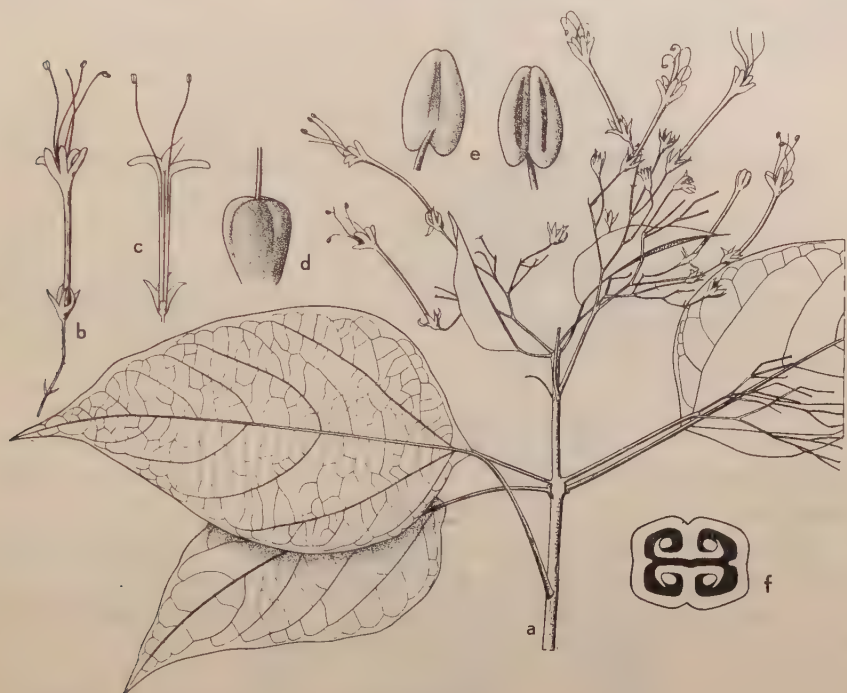


Fig. 2 — *Clerodendron populneum*, nov. spec. — a. branchlet with leaves and inflorescence; b. flower; c. id., longitudinal section; d. ovary and base of style; e. anther, ventral and dorsal sides; f. ovary, cross-section — after type specimen.

Central Division: Baroka, 20 m in alt., on savannah ridges (nr. 3781, *type specimen*).

Erect shrub 2 m high, fls. in April.

Apparently related to *C. disparifolium* BL. from Western Malaysia and with the common sea shore species *C. incrne* (L.) GAERTN., but distinguished from both by the peculiar *Populus*-like leaves (hence its specific name) and its non-exsert. style; and from the latter, moreover, by its deeply lacinate calyx.

Faradaya F. v. MUELL.

1. **F. chrysoclada** K. SCHUM. — Endemic in South New Guinea.

Central Division: Mafulu, 1250 m alt. (nr. 5219).

Open spreading tree, 10 m tall, solitary on artificial grassland,

evidently left when ground was cleared for gardens: fls. yellow in Sept.—Nov.

Undoubtedly a representative of this remarkable endemic species, thusfar known only from the Astrolabe Range, Central Div. The specimen bears, anomalously, its leaves in 4-merous alternating whorls, a phenomenon also occasionally observed in other Verbenaceae e.g. *Premna integrifolia*.

For the distribution of the genus see under *Clerodendron Brassii*.

Glossocarya WALL.

1. *G. Hemiderma* BENTH. & HOOK. — Queensland, South New Guinea.

Central Division: Kubuna, 100 m in alt., in rain forest (nr. 5674).

Scandent large shrub with white flowers in Nov.

First record of this genus and species in New Guinea. The disjunct area of the genus (Ceylon, Further India, Queensland) is, however, but little filled up by the discovery of *G. Hemiderma* in Papua.

Gmelina L.

1. *G. macrophylla* (R. BR.) BENTH. — New Guinea (Okaba, Malu), Queensland.

Western Division: Wuroi, Oriomo Riv., 10—30 m in alt., in edge of rain forest and scattered over savannahs (nr. 5753).

A bushy tree, 4—6 m high, shining lvs. grey beneath, with 2 large glands at base of lamina; fls. purple pink, fr. soft red, Jan.—March.

Premna L.

1. *P. inaequilateralis* EVA BEER & H. J. LAM, nov. spec. — *fig. 3* — *Arbor parva; ramuli teretes, novelli minute hirsuto-pubescentes, deinde glabrata; folia opposita chartacea, oblique rotundata vel rotundo-ovata, margine integra, basi oblique subcordata vel plerumque truncata, interdum paulo breviterque attenuata, apice late acuta vel obtuse acuminulata; supra sparse, in nervis supra et in lamina subtus et in petiolo densius pubescentia pilis simplicibus; 5.5—11.2 cm longa, 5—8.5 cm lata, petiolo 2.5—3 cm longo; costa cum nervis secundariis subtus paulo prominens, nervi secundarii 5—6, tertiarii transversii; inflorescentiae terminales, corymbosae, pubescentes, 6—9 cm longae, 10—14 cm latae, pedunculus \pm 2 cm longus; bracteae lineares deciduae; calyx cupuliformis 0.1 cm altus, bilabiatus, uno labio bidentato, uno plus minusve undulato vel obscure 3-denticulato, extus pubescens, intus glaber, in fructu haud elargatus; corolla 0.4 cm longa, tubo et in medio lobis minute*

adpresse pubescens, cetera petala glabra, intus fauce dense pilosa excepta glabra, bilabiata, labium superius integrum, inferius 3-lobatum lobo medio majore; *stamina* 4, vix vel haud exserta, sub fauce inserta; *ovarium* glabrum stylo vix exserto stigmate bifido.



Fig. 3 — *Premna inaequilateralis*, nov. spec. — a. branchlet with leaves and inflorescences; b. flower; c. calyx; d. corolla, opened so as to show the stamens, with pistillum — after type specimen.

Central Division: Mafulu, 1250 m in alt., common in forest regrowths (nr. 5536; *type specimen*).

A small tree of flat branching habit; fls. green in Sept.—Nov.

We are sorry that we have to add a new species to this extremely difficult genus, in which flower features are almost as vague and little distinct as those of

the extremely variable leaves. Its specific name is chosen because of the oblique leaf base, which is constant in the specimen examined.

2. *P. sessilifolia* H. J. LAM — Central Celebes, New Guinea.

Western Division: Dagwa, Oriomo River, alt. 45 m, common in rather extensive colonies on open grassy ridges (nr. 6007).

Leaves lying flatly on ground; fls. white, fragrant, fr. black, fleshy up to 1 cm diam., in Febr.—March.

The second record of this well distinguishable species in New Guinea, the other habitats being Kenegia riv. in North New Guinea and W. Celebes, where it was apparently collected at a similar locality as the present specimen.

Teysmanniodendron KOORD.

1. *T. bogoriense* KOORD. — Borneo, Ambon, Ceram, New Guinea.

Central Division: Dieni, Ononge Road, 500 m in alt. (nr. 3837).

Tall, slender tree, 30 m high, small crown; grey lenticellate bark, greenish when out; peduncles, pedicels, calyx whitish, corolla violet, fls. in Apr.—May.

This species is now known to occur in *Borneo*: West Borneo (HALLIER 3032); East Borneo, Sampit (FOR. RESEARCH INST. hb. 13944); Poeroektjahoe (Id. 10504) — *Amboina*: (FOR. RES. INST. hb. 14274) — *Ceram*: (RITTEN 497, 1898 and 2066) — *New Guinea*: North New Guinea, Hollandia (FOR. RESEARCH INST. hb. 14560); Manoc-kwari (Id. hb. 15905); South New Guinea (BRASS 3837).

The genus contains a few more species, e.g. *T. pteropodum* (MIQ.) BAKH. from Sumatra, Simaloer, Banka, Borneo and the Philippines, *T. Aherianum* (MERR.) BAKH. (cf. Journ. Arn. Arb. 16, 1935, 74) from the Philippines and the Solomon Islands and possibly also *T. longifolia* (MERR.) nov. comb. (= *Ficus longifolia*) from Mindanao and Celebes.

SOME PRELIMINARY NOTES ON THE ALGAE COLLECTION WEBER-VAN BOSSE.

by

JOSÉPHINE TH. KOSTER.

(Rijksherbarium, Leiden).

This extensive collection, famous among algologists both of the Old and the New World, forms part of the collections of the National Herbarium (Rijksherbarium) Leiden since 1934. About fifty years ago it was started by Mrs. Dr. A. A. WEBER-VAN BOSSE (1852—hodie), an enthusiastic pupil of HUGO DE VRIES.

The colonies of *Nostoc*, living in the ditches round about the Dutch village of Doorn, evoked her admiration, which was the primary cause of an intense study in the freshwater as well as in the marine Algae. In the harbour of Den Helder North Sea Algae were collected; by collecting Algae on trips to the French Atlantic Coasts and several times to Norway (1883—1885) and further on a South African journey (1894—1895) the herbarium grew, as it did by the Malaysian specimens collected in Java, Celebes, etc. (1888—1889). During this Malaysian tour Mrs. WEBER worked in Tjibodas, where she described the new genus *Phytophysa*. In Sumatra (West Coast, Lake of Manindjau) she discovered in collaboration with her husband, MAX WEBER, a new case of symbiosis between Algae and Sponges.

However, the great enlargement came, when the successful cruise of the Siboga (1899—1900) had finished its task. The Siboga Expedition, taking a place of honour among the deep-sea expeditions, was prepared and led by M. WEBER. The chief object was to continue the work of the Challenger (1872—1876) and of the Gazelle Expedition (1874—1878), as to marine life of the Malay Archipelago, to investigate the deep sea-basins and to collect as much as possible. Mrs. WEBER seized the opportunity to collect Algae, wherever possible, picking them up along the coasts, on coral reefs and by means of the trawl. Algal vegetations, typical for the tropic seas, like those of calcareous Algae (*Halimeda*, *Lithothamnion*, etc.) adding to the formation of coral reefs, could be

studied and photographed. Enormous banks of *Lithothamnion* (South Saleyer, S.W. of Timor, between Celebes and Borneo) were discovered at considerable depths. *Florideae* preferring a depth, on which only scanty light penetrates, were drawn up by the trawl from depths up to 55 m.

The extensive collection of Algae from the Siboga Expedition, contains numerous new species and many new genera. It forms the material, on which four of the works on the Siboga Expedition have been based: E. S. BARTON, The genus *Halimeda* (1901) — A. WEBER-VAN BOSSE and M. FOSLIE, The Corallinaceae of the Siboga Expedition (1904) — A. & E. S. GEPP, The Codiaceae of the Siboga Expedition, etc. (1911) and A. WEBER-VAN BOSSE, Liste des Algues du Siboga (1911—1928). The area searched by the Siboga was the Eastern Malay Archipelago, viz. the coasts of East-Java, Lesser Sunda Islands, Moluccas, New Guinea, Talaud-, Sangir- and Sulu Islands, Celebes, S.E. Borneo and Saleyer. The „Liste du Siboga” gives an elaborate and broad survey of the marine algal flora of the Malay Archipelago. This pioneer work will always keep its value together with the collection, on which it is based. In the year 1910 the University of Utrecht honoured Mrs. WEBER by offering her an honorary Ph. D. degree.

In studying marine as well as freshwater Algae Mrs. WEBER got into contact with many well-known algologists; the results of this contact are to be found in her herbarium. So, for instance, the genus *Ectocarpus* has been revised by KUCKUCK, the genus *Turbinaria* by Mrs. GEPP-BARTON, part of the *Sargassum*'s by TH. REINBOLD, etc. A correspondence with algologists in several countries, among whom C. SAUVAGEAU, F. BØRGESSEN, W. A. SETCHELL, N. E. SVEDELIUS, A. FORTI, YENDO, YAMADA, was kept up by Mrs. WEBER. In connection with her study concerning the genus *Caulerpa* (Monographie des Caulerpes, Ann. Jard. Bot. Buit. 15, 1898, 243—401) she went to Paris (ED. BORNET) and to Lund (J. G. AGARDH). The collections of the British Museum have also been visited by her.

The principle adhered to of giving on loan every specimen of her precious collection, if wanted by a serious algologist, enriched the herbarium by many important gifts in return to the kindness of its owner. A great number of *Cystoseira*'s from SAUVAGEAU, Algae from the French coasts from BORNET and THURET, Californian and other Algae from SETCHELL and GARDNER, Algae from BØRGESSEN (Siam, Jamaica, etc.), Japanese Algae from OKAMURA and YENDO, Algae from the Key Islands presented by ARNOLDI, specimens from the herb. GRUNOW, original speci-

mens from G. KARSTEN of epiphyllous *Trentepohliae* from East-Java, etc. thus form part of the herbarium WEBER-VAN BOSSE.

Besides these minor acquisitions four large collections were added, viz. those of HAUCK, KÜTZING, SURINGAR and LENORMAND.

When the herbarium HAUCK was available Mrs. WEBER purchased this important collection. F. HAUCK (1845—1889), the eminent algologist, was an autodidact. After the edition of „Die Meeresalgen Deutschlands und Oesterreichs” (RABENHORST’s Kryptogamenflora II, 1885) a Ph. D. degree was granted him by the University of Zürich. HAUCK spent a good deal of his life in Trieste (being a telegrapher in that town), where he availed himself of the opportunity to collect and study Adriatic marine Algae (Trieste, Cherso, Spalato, Miramar, Rovigno). When studying Adriatic Diatoms he made the acquaintance of GRUNOW, while the study of the Baltic and the North Sea Algae brought him into contact with SONDER. Specimens from several regions completed the collection, e.g. Algae from ZANARDINI (Red Sea), CUMING (Philippines, 1836—1839), A. DIETRICH (Australia), COLLINS (N. America), AL. BRAUN (Europe), VALIANTE, etc. Most of the types of HAUCK’s species are extant in his collection.

After the death of W. F. R. SURINGAR, professor of Botany at Leiden, his widow sold his collection of Algae, to which had been added the precious herbarium of KÜTZING, to Mrs. WEBER. F. T. KÜTZING (1807—1893) started his career as a chemist’s assistant and became afterwards a teacher at a secondary school at the German town of Nordhausen. During 1832—1833 he visited the University of Halle. The University of Giessen granted him the Ph. D. degree and in 1843 he was nominated a Royal Professor. During a trip to Italy and Dalmatia (Naples, Spalato) KÜTZING collected a number of Algae, which collection was increased by Algae from the North Sea (Heligoland, Wangeroog). The results of these activities have been laid down in his classic works: *Phycologia generalis* (1843, with illustrations engraved by the author), *Die Kieselschaligen Bacillarien oder Diatomeen* (1844), *Phycologia germanica* (1845), *Species Algarum* (1849) and *Tabulae Phycologicae* (1845—1871), which works had a far-reaching influence both on his contemporaries and afterwards. When examining his herbarium one is struck by the great accuracy of this algologist. KÜTZING was well aware of the value of the „type”: in many of his numerous types a label is to be found on which KÜTZING has written „Originalspecimen” or „specimen authenticum”. Autographic letters from well-known botanists are to be found in his herbarium, for instance from MENEGHINI (written in

1837), from REICHENBACH, together with a letter from KÜTZING himself, from AL. BRAUN (written in 1840). In the collection KÜTZING original specimens from several collectors are to be found, among whom may be mentioned: LYNGBYE, MENEGHINI, MONTAGNE (owner of a large herbarium of cryptogams from all parts of the world), BORY DE SAINT-VINCENT, C. and J. G. AGARDH, HORNSCHUCH (Austria, \pm 1836), BULNHEIM (Europe), KOCH (Asia Minor, Europe, 1836—1844), FRÖLICH (Heligoland), SONDER (Australia, coll. PREISS, 1838—1842; Peru, Ceylon), BINDER (Australia), F. VON MÜLLER (Australia, Tasmania), ZOLLINGER (Java, 1841—1843), HOOKER (N. America), SCHOMBURGK (Barbados, \pm 1840), KEGEL (S. America, \pm 1846), COULTER (California, \pm 1832), SELLOW (Brasil, \pm 1819), and also the botanical explorers A. VON HUMBOLDT (Brasil), ENDRESS, and TILESIIUS.

W. F. R. SURINGAR (1832—1898), who was a professor of Botany and Director in charge of the National Herbarium (Rijksherbarium), Leiden, was interested in Japanese Algae. In the part of his herbarium, that was preserved in the National Herbarium, marine Algae from Japan (sent by VON SIEBOLD, GRATAMA and TANAKA) are incorporated together with notes on its use and with water-colours, which are the originals of the illustrations in his works: *Algae japonicae*, Mus. Lugd. Bat. (1871), *Gloiopeltis* (1871—1872) and *Algues du Japon* I (1872), II (1874). It is to be regretted, that a number of types are missing. His *Characeae*, as well as those in the herbarium KÜTZING and in the National Herbarium, have been revised by AL. BRAUN. The genera *Cystophyllum* and *Sargassum* have been studied by GRUNOW. A number of *Algae* from the Netherlands are to be found in the SURINGAR herbarium, for a large part hailing from the collection of R. B. VAN DEN BOSCH; many of these specimens have been identified by KÜTZING, and reversely the herbarium KÜTZING contains specimens from VAN DEN BOSCH. Some of KÜTZING's species have been based on specimens sent by VAN DEN BOSCH. Algae from PELVET, AL. BRAUN, L. RABENHORST, KEGEL, ZOLLINGER, JUNGHUHN (Java), etc. completed the herbarium SURINGAR, together with several exsiccata collections.

The latest acquisition of the herbarium WEBER-VAN BOSSE was a part of the herbarium LENORMAND. S. R. LENORMAND (1796—1871), a lawyer in Normandy, lived at Vire and at Caen. Together with his friend L. A. DE BRÉBISSON (1798—1872) he made a large collection of Algae from all parts of the world (Adriatic, Canaries, S. Africa, Australia, Tasmania, Celebes, Antilles, New York, etc.). A large part of his Algae come from the coasts of Normandy, to which are added those edited

by CHAUVIN. On specimens from LENORMAND and DE BRÉBISSEON species of KÜTZING have been based.

Apart from the above mentioned large collections the herbarium WEBER-VAN BOSSE contains specimens from several regions: Malay Archipelago (BECCARI, TEYSMANN, MARTENS), Ceylon (HARVEY, FERGUSON), Friendly Islands (HARVEY), New Zealand (A. D. HOOKER, BERGGREN), America (HOWE, LE JOLIS, VICKERS, NAUDIN), Europe (GRIFFITH, BATTERS, FLAHAULT, GOBI, GRUNOW, FOSLIE, LAKOWITZ), etc.

As has been stated above the whole of the collection has been presented to the National Herbarium, Leiden, which before the fusion already possessed Algae from the herb. PERSOON (WALLROTH, BONNE-MAISON, LAMOUROUX), the herb. VAN ROYEN, BLUME (Java), ZIPPÉLIUS (Timor), KORTHALS (Mal. Arch.), HERING (Surinam), AL. BRAUN (Germany), BAENTZ (Europe) and from several Dutch collectors (VAN DEN BOSCH (some identified by L. RABENHORST), OUDEMANS, ABELEVEN, VAN DE SANDE LACOSTE, etc.).

In addition, the combined herbaria possess a number of exsiccata collections, of which the following may be enumerated:

Algae Müllerianae curante J. G. AGARDH distributae.

Algues des eaux douces de France.

ARESCHOUG, J. E. — Algae scandinavicae exsiccatae (Upsaliae, 1861—1897).

BØRGESSEN, F. — Algae marinae faeroenses.

BRAUN, RABENHORST, SITZENB. — Characeae von Europa.

BREUTEL, C. F. — Flora germanica exsiccata.

CHAUVIN, J. — Algues de la Normandie (Caen, 1827).

COLLINS, HOLDEN and SETCHELL — Phycotheca Boreali-Americana.

CROUANS, H. M. et P. L. — Algues marines du Finistère (Brest, 1852).

DESMAZIÈRES, J. B. H. J. — Plantes cryptogames de France.

FARLOW, W. G., ANDERSON, C. L. et EATON, D. C. — Algae Americanae borealis exsiccatae (Boston, 1877).

Flora Austro-hungarica exsiccata.

FUNCK, H. C. — Cryptogamische Gewächse, etc. (1806—1822).

HAUCK, F. et RICHTER, P. — Phykotheca Universalis (Triest et Leipzig, 1886—1889).

HOHENACKER, R. F. — Algae marinae siccatae, etc.

HOWE, M. A. — North American Algae, collected at San Juan, Porto Rico and Coll. in Great Rogged Island, Bahamas (Herb. of the New York Botanical Garden).

Hydrophytes marines du Morbihan.

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Many botanists and also sylvic, horticultural and agriculturalists and almost all taxonomists are, in the course of their daily task, meeting plant-names, the exact meaning, signification or derivation of which is not immediately clear to them. Being an intelligent and studious man, he often feels the desire to know more of a name than just its orthography and so he makes a grab at one of those books written to spread more knowledge about the matter. If it is the name of a genus or of a subgenus, WITTSTEIN's „Handwörterbuch“ is the book he needs, although it yields no help for genera younger than 1852 (date of preface). If it is a specific name or a latin or latinized botanical term, BISCHOFF is his man, either by his „Handbuch der botanischen Terminologie“ of 1833—1844 or by his smaller „Wörterbuch der beschreibenden Botanik“, of 1857 (2nd Ed.). In case these books cannot meet his wishes, on account of their age or merely out of deficiency, our present-day investigator will try to find the name in one of the more recent lists: BAILEY's „Companion for the Queensland student of plant life“ of 1893; SALOMON-SCELLE, Wörterbuch der botanischen Kunstsprache, 1904; KANNGIESSER, Etymologie der Phanerogamen-Nomenclatur, 1908 (mainly generic names); VOSS, Botanisches Hilfs- und Wörterbuch (6th ed. 1922), etc.

It is probable that in many cases the information thus obtained is either none, or at least unsatisfactory. Now the book announced here is only covering Phanerogams and ferns growing or grown in the Netherlands and in the Netherlands Indies but it may be readily accepted that this entails that it is usable for almost the whole of western Europe and of South-East-Asia. There is, however, a but, viz. in that the book is written in the Dutch language. This difficulty for foreign readers may, however, be compensated by two features; first of all by the name of the author who is known not only as one of the best connoisseurs of the Javan flora but also as a writer whose methods of investigation are exceedingly accurate and thorough; and secondly by the nature of the about 22500 items in this glossary, implying that most things can be understood with the help of a dictionary and many even without that.

I therefore recommend here with confidence this excellent book also for the use of non-Dutch botanists, horticulturalists, etc. BACKER, who is an autodidact, is as keen in botany as in the comparative knowledge of languages and in history. As far as possible all names have been traced back to their very origin. Therefore BACKER is very often more than a mere recorder, since he repeatedly corrects older etymologies or wittily satyrizes ridiculous mistakes. The prospectus of this book says that BACKER for some 5 years carried a both extensive and intensive correspondence in order to

obtain biographical particulars of about 2700 private persons whose names are connected with plant-names.

The proper list is preceded by a preface and an explanation; the latter is, except for a list of abbreviations, of little use for foreigners as it mainly contains notes on the (Dutch) pronunciation. The work terminates with a list (30 pages) of the principal author's names, their abbreviations and — as far as not mentioned in the main list — a short elucidation. The result of all this painstaking work, accomplished with the help of many, is a splendid book, which I would also like to see in the hands of all foreign taxonomists, for their own profit as well as for the fame of the botanical research in the Netherlands and its colonies.

Few people indeed will have the patience and the perseverance to go through an almost endless number of publications, ancient and recent (many of which being, moreover, by no means easily attainable), and to do it so thoroughly that, apparently, very few names are omitted, and that those inserted are accurately checked.

H. J. LAM.

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W. FEEKES, *De ontwikkeling van de natuurlijke vegetatie in de Wieringermeerpolder, de eerste groote droogmakerij van de Zuiderzee* (The development of the natural vegetation in the „Wieringermeerpolder“, the first large land reclamation of the Zuyder Zee; doctor's thesis) — Nederl. Kruidk. Arch. 46, 1936, 1—294, with maps, figures and plates (text in Dutch).

This investigation, being a part of the program of the Committee for the botanical investigation of the Zuyder Zee and environment, established by the Netherlands Botanical Society, was carried out during the years 1931—1935, with the purpose to study the development of the natural vegetation on the new land, concerning matters of biological dispersal, sociology and floristics. The polder, which was dammed up in the years 1927—1929, was reclaimed in 1930 and has an area of 200 km².

This new land consists of diluvium in the N.E. part and is further formed by old marine clay („fossil“ saltings), divided into two parts by a „fossil“ muddy shallow. Soon immigration of Angiosperms into the new land was stated; characteristic processes were the projection of vast populations of *Aster Tripolium* from foci on the coast and also aggregation of seedlings around the mother plants. Moreover, the sea bottom before reclamation was not at all a virgin one, as was proved by the examination of soil samples, which may be explained by the action of seawater as a means of transportation of seeds from the neighbouring coasts over great distances. On the other hand, the salinity of the soil must have been the factor to set bounds to the establishment of several species, which fact, however, considerably clouded the insight in the local migration conditions. Therefore experiments on germination and on mortality of germs were carried out. Rainwater appeared to be responsible for the transport over small distances only.

The number of anemochores was not so great as could be expected; only with extreme anemochores as *Aster Tripolium*, *Senecio vulgaris*, *Phragmites communis*, the action of wind was really effective. So it was in several *Chenopodiaceae* which form

„rolling plants“. Transportation by birds also played its part (species near the fresh-water wells; introduction of plants from the dunes). The number of anthropochores was particularly large (93 species). The author found himself to have unintentionally carried with his clothes and boots on 11 trips in the polder about 2000 diaspores, belonging to 57 species! The total amount of Angiosperm species occurring in the polder up to 1934 was 354; 221 more species, known from the neighbouring country, did not penetrate into the polder. Many of these species are rare in the surrounding regions or do not possess effective means of dispersal. The others may be considered as kept away by the salt. In the beginning the number of annual and biennial hibernating species was high, later on the number of hemi-cryptophytes and especially of geophytes increased. Of the 261 naturally introduced species 50 developed socially; only a small number of these became dominant and covered vast areas: *Aster Tripolium*, *Atriplex hastatum*, *A. littorale*, *Suaeda maritima*, *Senecio vulgaris*, *Poa annua*. Several species in the polder showed a remarkable polymorphism, e.g. *Salicornia herbacea*, *Spergularia salina* and *Aster Tripolium*. Of *Salicornia herbacea* 16 forms are described and partly pictured; 3 subspecies could be distinguished, viz. *stricta* DUM., *ramosissima* WOODS and *arborea* FEEKES. Dominance of a small number of species over large areas was very striking in the first vegetation (investigated according to the Netherlands-Scandinavian method), as has been often stated in similar conditions.

In the succession a hydrosere and a xerosere could be distinguished (Scheme I, p. 105—107); the hydrosere consisted of *Chlorophyceae* and a few Angiosperms; the xerosere could be subdivided into 1. a stage of *Cyanophyceae* and *Diatomeae*, 2. a stage of annuals, 3. a stage of species of more generations pro year and of biennials and perennials, 4. the natural pasture. Maps show the situation of the associations. The species-area curve of the vegetation corresponds with the formula of ARRHENIUS, except in very salty habitats, where the saturation curve of KYLIN was found. The frequency curve culminates in the sporadic species; on early desalted habitats a second culmination point is found in the most frequent species. By early desaltation less diaspores are kept away. Especially the uppermost layers of the soil are of importance for the development of seedlings. The dominant halophytes appeared to be more or less hygrophytic in their seedling-stage, viz. *Aster Tripolium*, *Suaeda maritima*, *Salicornia herbacea*, *Atriplex littorale*, *A. hastatum*. On dry, quickly desalted soil the annual halophytes seldom formed associations. Curves show the correlation between the occurrence, the average and the maximum degree of covering of the simple associations and the concentration of salt in the layers of 0—10 and 10—25 cm. In scheme II, p. 188, the degree of salt tolerance of a number of species is indicated. The selection of ecotypes may appear to be important for judging the sequence in the scheme mentioned.

A further factor of importance was the nitrogen. The first nitrophilous vegetation, being very luxuriant, was followed by a much less vital one. It was striking that several halophytes of the surroundings did not occur in the polder. Perhaps the factor N is giving the explanation here.

Bryophytes appeared especially after heavy rains and often suddenly covered large areas. Diversity in salt tolerance is also evident in several mosses. Bryophytes found in the polder are enumerated as are the Fungi and Algae.

The fauna of the new land was also submitted to a discussion. Typical for the new land was the appearance of large quantities of certain species of insects.

A separate chapter is devoted to the results of these investigations useful for practice.

It may be of interest in connection with the future reclamation of other parts of the Zuyder Zee to study the question whether and how far the first vegetation can be tolerated in other projected polders and how far the dispersal of the species could prognosticate about the nature of the soil.

S. J. VAN OOSTSTROOM.

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BOTANICAL RESULTS OF A TRIP TO THE SALAJAR ISLANDS

by

W. M. DOCTERS VAN LEEUWEN

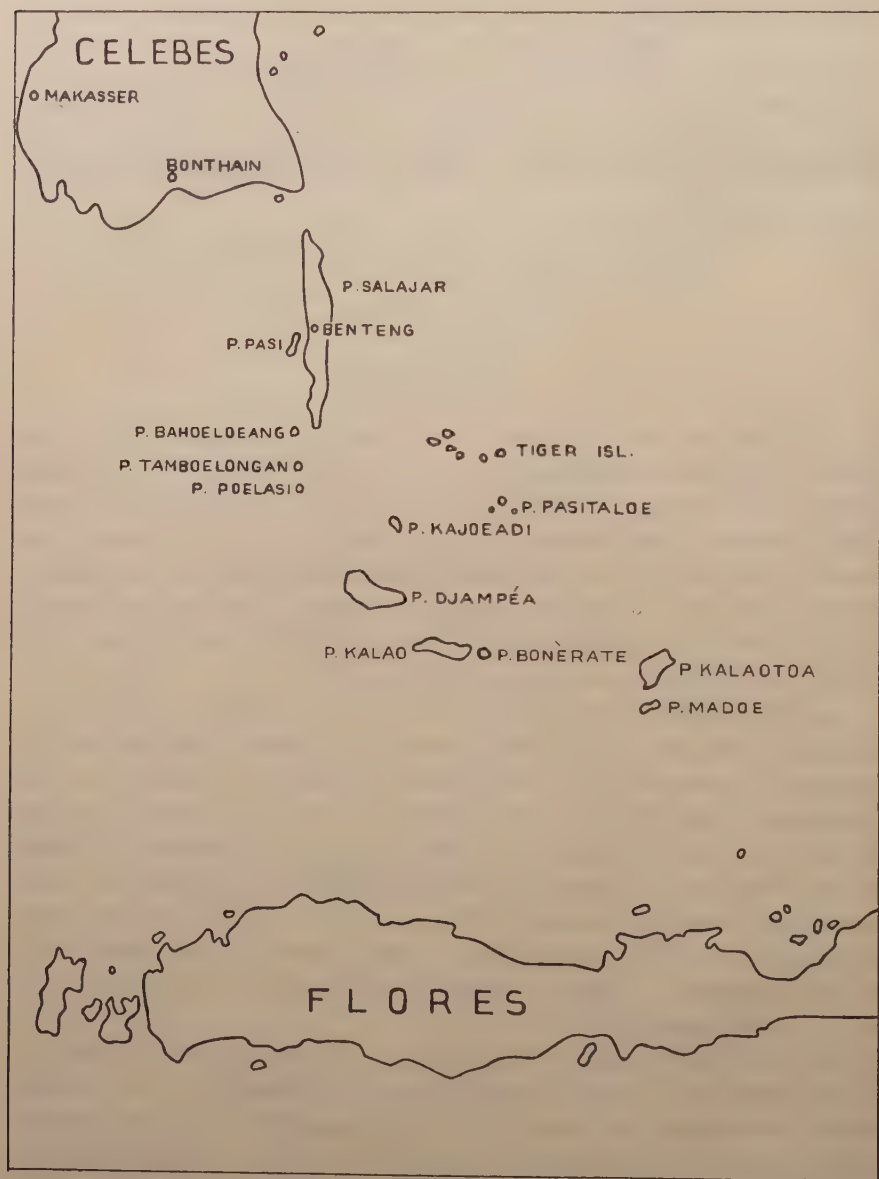
(Leersum, Holland).

1. INTRODUCTION.

The Salajar Islands strew the Flores Sea between Celebes and Flores. The group consists of no less than 73 smaller and larger islands. The principal islands are: Salajar or Tanadoang, Djampea, Kalao, Kalaotoa, and Bonerate. A number of smaller islands form together the group of the so-called Tiger Islands, and to the south of them are the very small, low Pasitaloe Islands. The Salajar group is situated between Long. 119°50' E. and 121°30' E. and between Lat. 5°36' S. and 7°25' S. See the map on p. 240.

In May 1913, I was enabled to visit this territory, thanks to a financial allowance of the „Maatschappij ter bevordering van het Natuurkundig Onderzoek der Nederlandse Koloniën” (Society for the Promotion of the Scientific Investigation of the Netherlands Colonies), for short: „Treub Society”, and also of the „Provinciaal Utrechtsch Genootschap voor Kunsten en Wetenschappen” (Utrecht Provincial Society for Arts and Sciences). The publication of the present paper was enabled by financial support of the „Leidsch Universiteitsfonds” (Leiden University Fund). I beg to tender my best thanks for all this valuable support here.

So far I did not come to giving an account of this trip and its botanical results. I nursed hopes to get an opportunity to pay another visit to these islands for completing the investigations. This opportunity, however, has never come, and at present a visit is altogether out of the question. Therefore I think it best now to record what I found in 1913. General surveys of the flora of many parts of the Malay Archipelago are as yet lacking, and for the present there is not much chance that an investigation will be made into the vegetation of these islands by somebody else. It may be, however, that if this yet might happen, my reconnaissance trip may serve as a basis for a more extensive inves-



P. = Poeloe = Island. Oe pronounce u.

tigation. This paper therefore is a description of the conditions observed at my visit in 1913. The conditions of the smaller, thinly populated islands will be the same as in those times. The main island Salajar was densely populated; remnants of the original vegetation were only to be seen here and there; very likely not much is left of them now, but for the sparsely populated southern point of the island.

Apart from the above-mentioned societies I also owe many thanks to the late Mr E. E. W. G. SCHRÖDER, who at the time of my visit was district-officer for the section Salajar. He accompanied me on my trip to the smaller islands and assisted me by word and deed. I also was his guest during my stay in Benteng, the capital of Salajar.

The governor of Celebes placed a Government steamer, the „Reiger”, at the disposal of the expedition, since the district-officer wanted to pay an official visit to the various islands belonging to his province. If we should not have had the disposal of this ship, we should have been compelled to make the excursions by sailing-proah, in which case much time would have been lost. The late Mr W. A. PÉNARD, official of the Encyclopedic Office at Batavia, also joined the excursion for studying the country and its population.

My botanical materials were incorporated in the Herbarium of the Utrecht University, where they were identified provisionally. Afterwards the plants were classified by Dr. J. G. B. BEUMÉE, at that time assistant, later on Director of the Herbarium at Buitenzorg. Besides he gave me a numbered list of the plants found in Salajar by J. E. TELJSMANN, part of which only was classified, and also a list of the plants collected by H. ZOLLINGER in the same island. The collection of TELJSMANN consists of 233 numbers, 6 numbers are known from ZOLLINGER. I myself brought 653 numbers from the various islands together. I do not conceal that thus only part of the flora is reconnoitred. The time of one month, which I had at my disposal, was too short for a thorough investigation of these islands situated so far apart. A great part of the available time had to be spent travelling. Here and there investigations could be made only at random. By the side of Phanerogams and Pteridophytes I made a collection of *Polyporaceae*, which are equally kept in the Herbarium at Utrecht. I also collected a great number of Zooecidia, A part of them have been described in 1916 (W. und J. DOCTERS VAN LEEUWEN - REIJNVAAN, 1916, p. 21); the descriptions of the remaining galls have been included in a larger, general work on the galls of the Netherlands' Indies (J. DOCTERS VAN LEEUWEN - REIJNVAAN and W. M. DOCTERS VAN LEEUWEN, 1926).

Short articles about part of the excursion and the vegetation appeared in serial form in the daily paper, the „Locomotief”, at Semarang in 1913.

2. FORMER INFORMATION ABOUT THE VEGETATION.

A few investigators have visited these islands, H. ZOLLINGER¹⁾, a Swiss botanist, who stayed in the Netherlands Indies for some considerable time, and J. E. TELJSMANN, the curator of the Botanic Gardens at Buitenzorg, who travelled a good deal in the Malay Archipelago in order to collect living plants and herbarium materials. Besides these, shorter and more extensive reports about the vegetation have been made in writings of missionaries or officials who visited these territories.

H. ZOLLINGER (1850, p. 1) stayed in Salajar from July 2nd to 5th, 1847. About this visit he wrote as follows: „As far as I know Salajar has not yet been visited by any natural scientist, at least nothing has been published about it. But since such a person will never be sent there on purpose, one will not take it amiss if I report about this island here, and will not return to this point in the future.” He climbed the top of the highest mountain of the island, the Bontanoharoe, which he mentions as being 1900 feet high. The food of the population consists mainly of maize and rice, grown on dry grounds. Besides these they grow many coco-palms and also cotton. *Arenga pinnata*, *Canarium commune* and tobacco are also found a good deal. Otherwise he does not mention anything about the vegetation or about making a collection. A few of the plants brought back by him occur in the „Systematisches Verzeichniss”, others were found in the Herbarium at Buitenzorg.

J. P. FRELJN (1850, p. 16), who stayed in Salajar in 1848, only mentions the occurrence of many coco-palms. W. H. DONSELAAR (1857, p. 227) gives more particulars. Good timber is found in Salajar, and also ebony, but the latter only of smaller dimensions. Quite common are capok (*Ceiba pentandra*) and various species of bamboo, *Canarium*, millet (*Setaria viridis* var. *italica*), maize, cotton, and some coffee; tobacco and indigo are also grown. J. A. BAKKER (1862, p. 215) visited the islands Bonerate and Kalao. In Bonerate timber is not found in

¹⁾ A biography of this able naturalist appeared in „Mitteilungen der Gruppe Niederländisch Indien der Neuen Helvetischen Gesellschaft”, Vol. VIII, no. 2, 1929, Buitenzorg. Dr. EDMUND SCHEIBENER gave a short biography of H. ZOLLINGER, Dr. D. F. VAN SLOOTEN sketched him as a botanist and described his importance for the knowledge of the Javanese flora.

great quantities, but fire-wood is, because the ground is covered for the greater part by brush-wood; in between occur open places covered with a species of tenuous grass. Probably *Andropogon contortus* is meant here, since this grass still covers vast areas. As to Kalao BAKKER only communicates that it is covered with wood. VAN DER STOK (1866, p. 398) furnishes more data; he says of Salajar that the flora is richly represented, notwithstanding the slight precipitation. Of the plants he mentions *Pandanus*, *Canarium*, one species of cactus (*Opuntia*), and *Liliaceae*. Many *Excoecaria* trees and *Nipa* palms grow in the marshes, and in the higher parts are found vast wildernesses of brushwood. Still higher the vegetation becomes sparse; *Cassia Fistula*, *Artocarpus incisa*, and *A. integra*, *Dodonaea viscosa*, and *Ficus Benjamina* are recorded. In the vast grass wildernesses formed by *Imperata cylindrica*, are found species of *Labiatae*, *Euphorbiaceae*, *Rubiaceae*, and ferns.

Of the plants grown and used by man VAN DER STOK mentions: Coco-palms, *Zea mays*, millet, rice, sugar-cane, *Coffea arabica*, species of *Dolichos*, tobacco, *Tectona grandis*, *Gossypium* species, *Corypha Utan*, *Diospyros Ebenum* (particularly in Bonerate and Kalao), *Arenga pinnata*, *Piper betle*, species of bamboo, *Calamus*, *Opuntia*, *Morinda citrifolia*, *Psidium Guajava*, *Annona muricata*, *Punica granatum*, *Ananas comosus*, *Capsicum annuum*, species of *Dioscorea*, species of *Musa*, *Mangifera indica*, *Carica Papaya*, many species of *Amarantaceae*, *Cucurbitaceae*, *Maranta arundinacea*, *Metroxylon* species, *Cycas Rumphii*, *Uncaria*, *Terminalia*, *Ricinus communis*, *Jatropha Curcas*, *Manihot utilisima*, *Datura Stramonium*, *Hibiscus tiliaceus*, *Curcuma domestica*, *Zingiber officinale*, *Alstonia*, *Ocimum gratissimum*.

VAN DER STOK observed the most luxurious vegetation in the southern part of the island Salajar.

TEJSMANN (1879, p. 111) made an excursion to Celebes and the surrounding islands in 1877. He also collected in Salajar. He stayed in this island from November 16th to December 11th. Owing to barrenness, in consequence of a long period of drought, the vegetation fell short of expectation, and for want of uninjured woods only little could be collected. Of the flora he mentions: Coco-palms, *Cassia Fistula*, *Borassus flabellifer*, and *Corypha Utan*. On the highest parts of Mt. Bontanoharoe TEJSMANN found *Mangifera indica* run wild, and *Vitex trifolia* as a hedge plant.

ENGELHARD visited the islands, and about this visit several reports were published. In the first (1884 a, p. 306) only a few cultivated plants are mentioned, viz. *Nipa*, *Arenga*, *Metroxylon*, and *Borassus*. In

a more extensive publication (1884 b, p. 263) he says that virgin forests are no longer present in Salajar; remnants can only be found near the top of the Bontanoharoe and in the region south of Barang-Barang. Small teak-forests are still found here and there in the regencies Balaboelo and Lajolo. They have been planted by order of the Governor of Celebes, CORNELIS SINTELAAR. These experimental plantations were made in 1735 from seed originating from the island Boeton and from Bima. According to ENGELHARD original teak-forests must still be present; he himself, however, has not seen them. Virgin forests of any importance do no longer occur in the islands Pasi, Bahoeleang, Tamboelongan, Poelasi, and Kajoeadi. The islands Djampea and Kalao, on the other hand, are still covered with virgin forests. In Djampea are still vast mangrove-forests which have developed to a smaller extent in Salajar.

This is what I have found on the older stages of the vegetation in these islands.

In the islands was a well-developed banana cultivation, the fruits were exported mainly to Makassar. In 1914 and 1915 complaints began to be heard about a serious disease which pretty well destroyed this cultivation. In 1915 the islands were visited by an official of the Institute for plant-disease (Phytopathological Service) at Buitenzorg, A. B. RIJKS; he reported about this visit, and this report has been published (1916, p. 1). He states that in 1880 the population numbered 75000 souls, who, for the greater part, were living in the main island Salajar. Agriculture is still in a very primitive stage; Kajoeadi and Djampea, however, formerly had a rather extensive banana cultivation. The main food-plant is maize, and in all the islands coco-palms are grown. A really popular cultivation was formerly that of cotton (*Gossypium* species); this cultivation, however, has been abandoned altogether, and the plant is now only found run wild. It stands to reason that the greater part of the report is taken up by a discussion of the banana disease, which did a great deal of harm to the plantations. The disease is an affection of the vascular system. In case of serious affection the plant is hardly able to develop.

3. GEOLOGICAL CHARACTER AND CLIMATE.

Few details are known about the geological nature of these islands; many islands have not been examined at all. WICHMANN (1895, p. 236) has described stones of Salajar, and further data may be obtained from an article by VERBEEK (1908, p. 31), who has examined Salajar and a

few other islands. In the geological lectures of RUTTEN (1927, p. 550) a short survey is given of what is known about this subject.

Salajar consists of a kernel of tufaceous sandstones and marls, sloping westwards, with on top very young corallites. Those which are found highest are probably the oldest. From west to east the level slopes over long ranges of hills up to the highest parts, only to go down steeply to the sea on the east side. ZOLLINGER and with him WICHMANN wrongly considered the highest top, the mountain Bontanoharoe, to be late eruptive. According to VERBEEK the mountain consists entirely of sandstones with interjacent andesite breccia. The limestone wall surrounding the island, which in parts is up to 80 m high, is interrupted wherever small rivers empty themselves into the sea. VERBEEK is of opinion that all the limestone depositions are late-Miocene. At the mouths of the rivers are found small areas of alluvion with mangrove vegetations.

The other islands too consist for the greater part of limestone rocks; the smallest are coral islands. The islands Tamboelongan and Poelasi consist, according to VERBEEK, of eruptive materials and raised coral reefs, which are not higher than 10 to 15 m.

VERBEEK saw Djampea only from a distance; he is of the opinion, judging by its shape, that it consists of eruptive rocks and breccia, may be from old corallites. WICHMANN described the stones brought back from this island by the Siboga expedition as granite and syenite-porphry, stones such as, RUTTEN remarks, would not have been expected in an island so near Salajar. But, he says, time will show whether this really is an old massive formation or that these plutonic rocks should rather be compared to tertiary granites, which have been known for some years as occurring in Flores.

The soil, where it is cultivated, is on the whole strongly washed away, and denuded of its humus. Only close to the sea good cultivation areas can still be found. In many islands the soil consists of hard coral substance, with between the projecting coral peaks patches of arable land. The result is that the areas which are no longer cultivated are overgrown for the greater part with grass vegetation and tenuous shrubs. The original wood too shows the luxuriousness of a real virgin forest in but a few places. RIJKS (1916, p. 3) also calls the soil rather poor with the exception of a few parts of Salajar and Djampea. In Bonerate the soil is extremely barren. In order to plant maize the inhabitants first have to dig holes in the limestone rocks and to fill these up with soil from lower, more fertile parts of the island.

The rainfall is not very great and rather equally divided over the months from November up to June inclusive, the other months being the dry monsoon. Raingauges are placed in Benteng, the capital of Salajar, and in Batangmata, situated half way between Benteng and the northern point of the island. Up to 1917 a pluviometer could be found in the island Bonerate, but in that year it was removed to the island Djampea. The figures of the rainfall were given to me by Prof. J. BOEREMA, director of the Meteorological Observatory in Batavia, for which I take pleasure in tendering him my thanks here. Below follow the said figures:

	Jan.	Febr.	Mrch	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Ann.
Salajar 1913-'33	152	133	157	168	220	135	45	14	12	26	101	192	1355
Batangmata 1922-'33	118	88	99	151	178	142	53	8	5	16	90	130	1078
Bonerate 1913-'17	346	245	257	111	203	113	35	13	10	24	203	351	1911
Djampea 1917-'33	228	192	184	87	96	52	19	9	21	28	80	198	1194

The measurements of Bonerate and Batangmata cover too short a time to yield a trustworthy average. RIJKS gives the average rainfall of the years 1909 to 1913 as regards Bonerate, and records as annual 1327 mm. It seems as if between 1913 and 1917 there must have been one or more years with a large rainfall.

The main of these two figures is 1619. BRAAK (1922, p. 460) gives an average over 9 years of 1596 mm. He also records that the islands Salajar and Bonerate have a lively air motion, and from that it follows that the drought is of great influence.

4. SHORT DESCRIPTION OF THE EXPEDITION.

On April 30th the ship of the Royal Dutch Navigation Company, which has taken me on board at Makassar, sails just before sunrise past the south coast of Salajar. The ranges of hills are clearly visible. At half past five the ship casts anchor in the bay between the main island and the small island Pasi. The district officer (Indian Civil Servant), Mr. E. E. W. G. SCHRÖDER meets me at the boat and receives me hospitably in his spacious house. The day of arrival and the next few days are spent with reconnoitring the neighbourhood and preparing the collecting materials for the trip by Government steamer. The „Reiger”

arrives in the roads in the afternoon of May 2nd and the actual trip begins the next day. We first sail round the northern side of Pasi, and then again to the south over a dead smooth sea, between the south point of Salajar and the island Bahoeleang, and next to the east of the islands Tamboelongan and Poelasi towards Kajoeadi. The first mentioned island displays along its coast a dense plantation of coco-palms, the ridge is covered with thin forest, and on the slopes we discern maize plantations and also a few lontar palms: *Borassus flabellifer*. With a field-glass we can recognize a few beach-plants such as *Ipomoea Pes-caprae* and *Spinifex littoreus*, growing on the sandy beach in front of the coco-nuts. The southern point of Salajar is densely covered with wood, and a few campongs are surrounded by coco-palms. On the most southern end, where the range of hills steeply descends down to the sea, we see behind the beach a few groups of *Casuarina equisetifolia*. The islands Tamboelongan and Poelasi have been disforested almost completely, on the southern side are slightly more trees than in the north and east parts; the naked, red-coloured hills project above the coco-palms, they bear only here and there a sparse vegetation of grasses and low shrubs.

In the afternoon the ship drops anchor at the west side of the island Kajoeadi; the island is surrounded by a coral reef which stretches far into the sea, and therefore we are rowed ashore. This coast, particularly the northern part, consists of limestone rocks with shallow caves. A large block, fallen down from these rocks, and now bathed by the sea, bears a Composita with fleshy leaves and beautiful, purple capitula: *Vernonia actaea*. The southern part has a sandy beach, covered with many beach plants. We walk along the beach, through the coco plantations and the campong. Everything looks extremely neglected. Through badly kept banana and maize plantations we walk some distance up the hill, the Tandjoenglipang. Up to the highest top it is pretty well bare. Finally we return to the ship.

May 4th. At half past five we go again by barge to the shore, and walk through the campong, the neglected coco, banana, and maize plantations towards the north, in the direction of the hill called Bonélambèrê. Behind the plantations we find a thin wood with small trees and a few lianas; but few plants are flowering. The soil consists of coral stones, which project with sharp points above the thin layer of humus, and which render walking very difficult. Then back to the ship again, which leaves at 10 o'clock. We sail to the north east of the largest island Djampea and to the north of Kalao, and by 5 o'clock we arrive at the west side of the island Bonerate. The northern coast of Kalao is steep,

and full of grottos and fissures, and towards the east is a reef of stones, projecting above the sea, but entirely bare. The coast of Bonerate is equally steep, and consists of rocks bearing an extremely sparse vegetation. An official of the Civil Service, residing in Bonerate, comes on board in order to accompany the trip some way.

May 5th. At 5.30 a.m. the ship sails past the south side of Bonerate towards the most easterly island of the group, Kalaotoa. We arrive at the island at 2 o'clock, and the ship casts anchor at about one hour's rowing away from the west coast; we disembark near a small campong, and look for plants in the neighbourhood.

May 6th. The boat is brought up again near the same campong; I make an excursion into the hills with 15 coolies. We first pass through neglected arable land, where here and there maize, *Ricinus*, and other field-produce is grown, and penetrate through again deserted parts which are covered with thin, young wood. Through thin forest up to the top, which is about 320 m high. We return to the campong by a steeper way, and go back to the ship with a small proah. A swarm of white butterflies (*Pieridae*) moved in the morning along the west coast from south to north, thus forming a long, white ribbon, which in the afternoon had become less dense, but which still went on. This phenomenon only ended by nightfall.

May 7th. The ship sails at half past five between Kalaotoa and the southern, neighbouring, smaller island Madoe in order to observe the shape of the mountain, and then returns to Bonerate. We pass along the steep north coast of this island, arrive at 2 o'clock at the west side, and are rowed ashore. As has been said before, a civil servant resides in this islands, and the consequences are clearly visible. The campong looks very trim and neat, with well-kept roads and houses with compounds. We collect plants in the surroundings, and return to the ship after sunset. From the house of the civil servant an avenue of a species of large *Ficus* leads almost down to the sea; the trees are full of glow-worms, which emit their light and go out simultaneously. We go back by proah across a strongly phosphorescing sea.

May 8th. In the morning we make an excursion to the hill, which is about a hundred meter high, through neglected arable land and low brushwood, with alternate stretches of grass. At 12 o'clock we are back on board the ship, which sails to the Pasitaloe islands. These are small, low coral islands. In one of them is a campong, consisting of only a few houses, and around it a few patches of arable land. Otherwise, however, these islands are only covered with small trees and beach plants.

May 9th. By sailing barge we go to the western island of the Pasitaloe group; it is about 1 kilometer long and half a kilometer broad. Although there are no houses in this island, the soil in the middle part is yet cultivated. In the afternoon the „Reiger” sails to the island Kalao. From the ship we see on the north side a light-coloured teakwood stand out against the surrounding vegetation. We make for this wood, and ascend the slope. The wood stretches from the coast to a height of about 50 m. Between the teak trees was very much brushwood, but only few plants were flowering. Later on we return to Bonerate, where the district officer has to look after some government affairs, and May 10th we spend before the coast.

May 11th. Early in the morning we sail to the almost unvisited south coast of the island Kalao; we are set ashore on a narrow, sandy beach, near a small campong. The coast consists of limestone full of grottos, and behind a narrow girdle of beach plants we find a rather dense virgin forest. We walk in a western direction, and encounter coral rocks, which end in the sea, so that we have to wade through the water for quite a long time. Here and there are small, sandy patches of beach. The excursion comes to an end at a large campong; we are rowed back to the ship, and then sail to the largest island, Djampea.

May 12th. The ship rides at anchor in a large bay to the south west of the island; we are rowed in to shore near the campong Marégé. Together with 24 coolies we make for the interior of the island, first through coco plantations, then through *Imperata* wildernesses, which are surrounded by high forest. Everywhere we see trails of deer, and here and there wild boars are startled. The wood into which we penetrate next consists of heavy trees, with much growth of rattan; the plants climb high up in the trees, and long festoons lie over the ground, so that a wilderness has arisen into which it is hardly possible to penetrate. The trees stand rather far apart, and the shade is not very dense, but yet the growth of plants seems to be hampered by other causes. But for rattan there is very little undergrowth. We soon reach the hills, and climb gradually upwards. After about 4 hours' climbing we reach the highest top, some 500 m high. The greater part of the coolies and my plant-collector have been left behind on a foretop in order to put up some accommodation for the night. On the top are large stones, which bear here and there specimens of a white flowering *Begonia*. There are more specimens of *Asplenium Nidus* here than on the slopes. The entire wood is strikingly poor in epiphytes and flowering plants. In the meantime a tent has been put up on the foretop; we return to

this point, take some lunch, and then decide to go back to the ship, since the scarcity of flowering plants renders a longer stay unnecessary. There was one exception: a huge liana, *Mucuna gigantea*, was flowering everywhere. The inflorescences with the yellow-green papilionaceous flowers hang down by long, thin peduncles, from the crowns of the trees to about $1\frac{1}{2}$ —2 m above the ground.

May 13th. The ship sails past the south coast towards the east, and we are rowed ashore at the campong Pekangkang; from here we first walk in an eastern direction along the coast, partly we sail by praoh through a marvellous mangrove forest, then we sail some distance up the river Elè Lampa, and next walk towards the campong Paromana, which is situated on the south-eastern point of the island. From here we walk right across the island towards the campong Oedjong on the north coast. The territory we pass consists for the greater part of neglected maize fields, woods which have been cut down, and mainly *Imperata* wildernesses. The ship has sailed past the east coast, and now rides at anchor before Oedjong.

May 14th. With a few coolies I make an excursion to the west side, through vast *Imperata*-fields towards the hills, and to one of the many tops, some 300 m above sea-level. Here we find a beautiful virgin forest; the undergrowth, however, was very poor.

May 15th. The ship sails in a westerly direction, and we go ashore near the campong on the north side, Boné Lamběř, where all men are absent. Finally we find a few persons who bring us through endless *Imperata* fields to the wood. A path has to be cleared; this detains us a long time owing to the rattan wildernesses. We pass by a clear brook, but nor is here the vegetation any richer than what we have seen so far. We climb up to the 300 m level, and then descend through other parts; here also virgin forest and many *Imperata* fields. We arrive in the west side near the campong Benteng; the ship lies in a large bay surrounded by islands.

May 16th. We go ashore and walk along the beach and through the vast mangrove, which consists mainly of species of *Bruguiera*, species of *Rhizophora*, and *Sonneratia*; the *Bruguieras* particularly had developed into robust trees with enormous aerial-roots.

May 17th. Overnight the ship sails back to Salajar, where we arrive at 5 o'clock in the afternoon.

The next few days are spent with arranging the collections, and making preparations for an excursion to the mountains of Salajar.

May 20th. With many coolies we leave early in the morning; the

way first leads through coco plantations and mangrove forests, and along shaded roads into the hills. The vegetation gradually becomes richer, but yet it is a poor remnant of what formerly it must have been. By 12 o'clock we arrive at the pasanggrahan (Government resthouse for visitors), where we stay a few days in order to collect plants in the neighbourhood. The pasanggrahan is situated at an altitude of about 300 m, just above a campong Bitombang, so that the surroundings are cultivated for the greater part. At the back of the house we have a view of the highest mountain of the island, the Bontanoharoe.

May 22nd. We continue our way upwards, and after a few hours' climbing a long steep paths we reach the top of the Bontanoharoe, about 600 m above sea-level. On a ridge, covered with grass, between remnants of the virgin forest, is a small hut, from where we have a beautiful view of the west side of the island. The top itself is flat, and covered with wood, with alternate grass and shrub wildernesses. *Psidium Guajava* has run wild everywhere and is fructifying amply. In the evening the wild boars feast upon the fallen fruits. Towards the east coast the country goes down steeply, and the slopes bear but little vegetation. This part of the island is richer in plants than any other visited so far. For several days we make excursions and collect as many plants as possible.

May 25th. We go back to Benteng along a ridge running in a north-western direction; at first the way leads down gradually, but nearer to the plain the slope becomes steeper. The ridge is very narrow, with on both sides perpendicular walls; everything is quite white owing to the limestone; the growth of plants is extremely poor.

May 26th. This day is spent with preparing an excursion to the southern point of Salajar; the chief of a campong there, of Barang-barang, goes home to-morrow by proah, and I may join him.

May 27th. In a small heavily laden flying proah we leave Benteng early in the morning, at first rowing, later on by sail. We sail close under the west coast, which consists of steep limestone rocks bearing many *Pandanus* and *Cycas*. The sea undermines the coast, everywhere are caves, and large blocks of rock lie spread in the sea. Halfway, at campong Tiele-Tiele, we take a heavier proah and before long we are sailing again southwards over a rough sea. At half past six we reach the campong Tonkè-Tonkè, from where we reach Barang-Barang after a quarter of an hour's walk. We put up our camp-beds in the house of the chief of this campong, and soon retire behind the mosquito-curtain, for this part is known for its many mosquitos and malaria.

The next few days we make excursions in the neighbourhood, and

amongst others right across the island towards the east side, where a few small campongs are situated, Bonesela and Pinang. The greater part of the south point is covered with thin wood and along the coast here and there with mangrove forests.

May 30th. We leave at 8 o'clock in the morning sailing before a stiff breeze, and thus we reach Benteng at half past two.

The next days are used for packing everything; we have to wait three days for the steamer of the Royal Dutch Navigation Company, which was expected on June 1st, but which did not arrive until June 4th, at 6 o'clock in the afternoon. At night we sail for Makassar, and there the trip came to an end.

5. THE ISLAND OF SALAJAR.

ENGELHARD (1884 b, p. 263) records that this island is 635 square kilometers large, the population being about 80 000. This rather dense population is cause of the fact that the greater part of the island is cultivated, or consists of deserted arable land. The original vegetation can still mainly be found in the thinly populated south point and along the coasts. The sandy beach, which occurs here and there, is covered with the ordinary beach plants: *Ipomoea Pes-caprae*, *Euphorbia Atoto*, *Cassytha filiformis*, *Caesalpinia Crista*, *Canavalia maritima*, *Desmodium umbellatum*, *Wedelia biflora*, and *Spinifex littoreus*. In some places where the beach is somewhat wider, and where small dunes have developed, occur dense wildernesses of *Caesalpinia Crista*, *Pandanus tectorius*, and *Opuntia* species, which are pretty well impenetrable. The steeper limestone beaches bear mainly *Cycas Rumphii*, *Pandanus tectorius*, and the *Vernonia* with fleshy leaves, *V. actaea*, which is mainly found close above the sea. A shrubby *Euphorbia*, *E. plumerioides*, is common on calcareous coasts on the east side of the southern point of the island.

A mangrove vegetation has developed at the mouths of rivers on the west side of the island and in moist, muddy parts along the coast. It is not rich in species, and the population has cut down a good deal. *Avicennia officinalis* formed on the inner side of the actual mangrove small dense groves; full-grown specimens were rare; there were also here and there dense groves of *Excoecaria Agallocha*. I failed to find any well-developed *Barringtonia* association, although various representatives occurred along the coasts of this island.

Everywhere behind these formations are plantations of *Cocos nucifera*, sometimes wide, sometimes narrower strips, and this palm is also

cultivated by the population in the interior even quite up in the hills. The trees stand very close together, and the ground is badly kept, so that there is a dense undergrowth of weeds. Among them are particularly common: *Triumfetta indica*, *Crotalaria striata*, *Sida acuta* and *S. rhombifolia*, *Urena lobata*, *Elephantopus scaber*, and *Oplismenus compositus*, often also *Imperata cylindrica*. Behind, and sometimes between the coco plantations are the fields of the population, and arable land is also found in and against the hills wherever there is a proper tillable top-part. The greater part of these hills, however, especially there where the soil consists of limestone, is uncultivated, and is covered with a very sparse vegetation of grass and shrubs. Everywhere the white limestone is visible between the plants. Nothing is left of the original vegetation. *Imperata cylindrica* is common, but close grass-fields have developed nowhere. The principal shrubs which grow scattered are: *Lantana Camara*, *Streblus asper*, *Sida rhombifolia*, *Glochidion molle* and *G. nigrum*, *Pittosporum timorense*, *Grewia acuminata*, *Ehretia laevis*, and *Azima sarmentosum*, all of them as small specimens. There are also small specimens of *Ficus retusa*. This poor vegetation covers the ridges and slopes up to a height of about 250 m; from here upwards is rather more arable land, and remnants of the original vegetation are found along moisty, sunken roads, and along brooks and small rivers. At the highest part, about 600 m above sea-level which is a kind of plateau, are small patches of virgin forest, but here too the greater part is covered with grass. Besides there are vast wildernesses of *Psidium Guajava*. In places where the soil is marshy, occur small wildernesses of a large *Pandanus*. In the woods are still other larger trees, which, however, are not in flower, so that I could not collect any materials. *Ficus fistulosa* and *F. retusa*, *Dysoxylum* species and *D. arborescens*, *Actinodaphne* species, *Alangium sundanum*, and *Pithecolobium Junghuhnianum* occur, and besides many shrubs, such as: *Diospyros ellipticifolia*, *Pavetta indica*, a *Coffea* species, *Petunga longifolia*, *Glochidion zeylanicum*, *Rubus alcaefolius* and *R. rosaefolius*, *Grewia laevigata*, *Evodia* species, *Leea angulata* and *L. aequata*, *Schefflera elliptica* and *S.* species. Several lianas and climbers such as: *Embelia philippinensis*, *Thunbergia fragrans*, *Ipomoea gracilis*, *Cissus hastata*, *Mucuna pruriens*. Among the herbs particularly several ferns, such as: *Arthropteris oblitterata*, *Diplazium polypodioides*, and also *Desmodium zonatum*, *Panicum colonum*, *Calanthe veratrifolia*, *Habenaria* species. *Calanthe* occurs locally in dense vegetations. Also in these wood remnants epiphytes are rare; *Asplenium Nidus* only could be found here and there in larger numbers.

The steep south coast, which is about 400 m high, was covered for the greater part with grass and thin shrub vegetations.

In the southern part of the island, which is more thinly populated, are more forests, but here too they are thin and poor in epiphytes. In the muddy bay near the campong Barang-Barang is a vast mangrove forest, which, however, consists of but few species, mainly species of *Bruguiera*, *Ceriops Candolleana*, and *Rhizophora mucronata*. On rocky patches are found rather more *Rhizophora stylosa*, *Bruguiera caryophylloides*, and *Pithecolobium umbellatum*.

In many places the limestone rocks rise steeply up from the sea, and these walls bear particularly *Cycas Rumphii*, *Pandanus tectorius*, and *Euphorbia plumerioides*; *Casuarina equisetifolia* is found in sandy zones; *Piper retrofractum* is also common on these coasts.

Plants found in the island of Salajar.

Pteridophyta.

Lycopodiaceae.

1. *Lycopodium cernuum* L., 550 m, D.¹⁾ 1742.

Selaginellaceae.

2. *Selaginella plana* HIERON., T. 13879; 500 m, D. 1761.

Psilotaceae.

3. *Psilotum nudum* L., D. 1793.

Schizaeaceae.

4. *Lygodium circinatum* SW., 300 m, D. 1714; 500 m, D. 1749.

Polypodiaceae.

5. *Adiantum caudatum* L., 250 m, D. 1678 — 6. *A. lunulatum* BURM., 200 m, D. 1657 — 7. *Anthrophium callifolium* BL., D. 1722 — 8. *Arthropteris oblitterata* J. SM., 550 m, D. 1769 — 9. *Aspidium polymorphum* WALL. et WRIGHT., 300 m, D. 1720 — 10. *Asplenium contiguum* KAULF., 50 m, D. 1884 — 11. *A. Nidus* L., 400 m, D. 1699 — 12. *Cyclophorus lanceolatus* ALSTON, 200 m, D. 1659; 500 m, D. 1783 — 13. *Davallia denticulata* METT., 200 m, D. 1840 — 14. *Dictyopteris irregularis* PR., D. 1751 — 15. *Diplazium polypodioides* BL., 550 m, D. 1770 — 16. *D. proliferum* THOU., D. 1768 — 17. *Drynaria querci-*

¹⁾ T = J. E. TEIJSMANN; Z = H. ZOLLINGER; D = W. M. DOCTERS VAN LEEUWEN.

folia J. SM., T. 13636, 13856; 200 m, D. 1660 — 18. *Dryopteris pteroides* O. K., 300 m, D. 1719 — 19. *D. subpubescens* O. K., D. 1785 — 20. *D. uliginosa* C. CHR., T. 13877 — 21. *Hemionitis arifolia* MOORE, 300 m, D. 1652 — 22. *Microlepia speluncae* MOORE, T. 13584 — 23. *Nephrolepis biserrata* SCHOTT, 200 m, D. 1825 — 24. *N. exaltata* SCHOTT, T. 13618; 300 m, D. 1731 — 25. *Notholaena hirsuta* DESV., 300 m, D. 1811 — 26. *Polypodium scolopendria* BURM., 300 m, D. 1715, 1721 — 27. *Pteris quadriaurita* RETZ, 300 m, D. 1723 — 28. *Stenosemia aurita* PR., D. 1747.

Gymnospermae.

Cycadaceae.

29. *Cycas Rumphii* MIQ., D. 1881.

Gnetaceae.

30. *Gnetum Gnemon* L., D. 1779.

Angiospermae — Dicotyledonae.

Casuarinaceae.

31. *Casuarina equisetifolia* L., T. 13890; D. 1511.

Moraceae.

32. *Cudrania javanensis* TRÉC., T. 13828 — 33. *Fatoua japonica* BL., T. 13920; 200 m, D. 1828 — 34. *Ficus Ampelos* BURM., 300 m, D. 1650 — 35. *F. annulata* BL., T. 13762 — 36. *F. Benjamina* L., T. 13864; D. 1886 — 37. *F. callicarpa* MIQ., T. 13616, 13793, 13926 — 38. *F. fistulosa* REINW., D. 1772, 1808 — 39. *F. glomerata* ROXB., 100 m, D. 1669 — 40. *F. hispida* L. f., D. 1889 — 41. *F. infectoria* ROXB., T. 13758 — 42. *F. retusa* L., T. 13581; D. 1757, 1798; 300 m, 1810, 1912 — 43. *F. Rumphii* BL., T. 13824 — 44. *F. superba* MIQ., 400 m, D. 1725 — 45. *Phyllochlamys taxoides* KOORD., 50 m, D. 1908 — 46. *Streblus asper* LOUR., T. 13812; 50 m, D. 1672, 1735.

Ulmaceae.

47. *Trema orientalis* (L.) BL., T. 13884, 13908.

Urticaceae.

48. *Fleurya ruderalis* GAUD., D. 1897 — 49. *Laportea* species, T. 13791 — 50. *Pilea* species, D. 1697 — 51. *Pipturus incanus* WEDD., T. 13901.

Piperaceae.

52. *Heckeria umbellata* KUNTH. var. *subpeltata* DC., 550 m, D. 1758 — 53. *Peperomia pellucida* H. B. K., 150 m, D. 1841 — 54. *P. species*, 400 m, D. 1797 — 55. *Piper betle* L., 550 m, D. 1741 — 56. *P. caninum* BL., 300 m, D. 1734; 400 m, D. 1807; 550 m, D. 1745 — 57. *P. miniatum* BL., T. 13638 — 58. *P. retrofractum* VAHL, D. 1913.

Santalaceae.

59. *Exocarpus latifolius* R. BR., D. 1928.

Olacaceae.

60. *Ximenia americana* L., T. 13810.

Loranthaceae.

61. *Amylothea stenopetala* DANS., T. 13587; 200 m, D. 1822 — 62. *Ginalloa Arnottiana* KORTH., 300 m, D. 1712 — 63. *Seurula fusca* G. DON., T. 13771; 400 m, D. 1709.

Chenopodiaceae.

64. *Salicornia brachiata* ROXB., T. 13892; D. s. n.

Amaranthaceae.

65. *Achyranthes aspera* L., 50 m, D. 1872 — 66. *Aerva scandens* WALL., 50 m, D. 1873 — 67. *Allmania nodiflora* R. BR., D. 1862 — 68. *Cyathula prostrata* (L.) BL., D. 1842.

Nyctaginaceae.

69. *Boerhaavia diandra* BURM., T. 13589 — 70. *B. mutabilis* R. BR., T. 13899 — 71. *Pisonia aculeata* L., T. 13625, 13830; D. 1869.

Aizoaceae.

72. *Glinus lotoides* LOEFL., T. 13613 — 73. *Sesuvium portulacastrum* L., D. s. n.

Cactaceae.

74. *Opuntia species*, D. s. n.

Portulacaceae.

75. *Portulaca oleracea* L., D. s. n.

Euphorbiaceae.

76. *Acalypha Caturus* BL., T. 13594, 13610, 13875; 550 m, D. 1765 — 77. *Alchornea rugosa* MUELL.-ARG., 400 m, D. 1850 — 78. *Antidesma*

ghaesembilla GAERTN., T. 13871 — 79. Breynia species, 100 m, D. 1877 — 80. Bridelia monoica MERR., 200 m, D. 1835; 50 m, D. 1891 — 81. Cladogynos orientalis ZIPP., Z. 1165 — 82. Claoxylon species, D. 1654; 400 m, D. 1694 — 83. Codiaeum variegatum BL., 550 m, D. 1764 — 84. Euphorbia Atoto FORST., T. 13925 — 85. E. plumerioides TEYSM., D. 1894 — 86. Excoecaria Agallocha L., 1856, 1931 — 87. Gelonium species, 400 m, D. 1695 — 88. Glochidion molle BL., 250 m, D. 1816 — 89. G. rubrum BL., 200 m, D. 1827 — 90. G. zeylanicum JUSS., T. 13799; 600 m, D. 1726 — 91. Homalanthus populneus O. K., 300 m, D. 1716 — 92. Macaranga hispida MUELL.-ARG., D. 1754, 1755 — 93. Mallotus philippinensis MUELL.-ARG., 200 m, D. 1681; 400 m, D. 1855, 1866, 1870 — 94. M. resinusus MERR., T. 13912 — 95. Phyllanthus species, D. 1680 — 96. Ricinus communis L., D. s. n. — 97. Rottlera tinctoria HASSK., T. 13881 — 98. Strophoblachia fimbriicalyx BOERL., D. 1879.

Annonaceae.

99. Artabotrys odoratissimus R. BR., 50 m, D. 1904 — 100. Polyalthia canangioides BOERL., T. 13576 — 101. Unona discolor VAHL, D. 1650 — 102. Uvaria littoralis BL., T. 13611; 250 m, D. 1690.

Aristolochiaceae.

103. Aristolochia Tagala CHAM., 300 m, D. 1817.

Lauraceae.

104. Actinodaphne species, 500 m, D. 1773 — 105. Cassytha filiformis L., D. s. n. — 106. Litsea Forstenii BL., T. 13588 — 107. L. ochracea BL., T. 13604.

Hernandiaceae.

108. Hernandia peltata MEISSN., T. 13850.

Menispermaceae.

109. Stephania Forsteri A. GRAY, 400 m, D. 1792.

Capparidaceae.

110. Capparis sepiaria L., T. 13836.

Moringaceae.

111. Moringa oleifera LAMK., D. 1868.

Flacourtiaceae.

112. Casearia grewiaefolia VENT., T. 13815.

Begoniaceae.

113. *Begonia* species, 550 m, D. 1746.

Dilleniaceae.

114. *Tetracera scandens* MERR., 550 m, D. 1750.

Guttiferae.

115. *Calophyllum Inophyllum* L., 400 m, D. 1848.

116. *Garcinia duleis* KURZ, T. 13579.

Pittosporaceae.

117. *Pittosporum timorense* BL., D. 1914.

Rosaceae.

118. *Rubus alcaefolius* POIR., 500 m, D. 1732 — 119. *R. rosaefolius* SM., 600 m, D. 1737.

Mimosaceae.

120. *Acacia* species, 100 m, D. 1661 — 121. *Pithecolobium Jung-huhnianum* BENTH., 400 m, D. 1805 — 122. *P. umbellatum* BENTH., T. 13759; D. 1933.

Papilionaceae-Caesalpinioideae.

123. *Bauhinia binata* BLANCO, D. 1932 — 124. *B. Lingua* DC., T. 13639, 18031 — 125. *Caesalpinia Crista* L., 300 m, D. 1812 — 126. *Cassia alata* L., 400 m, D. 1852 — 127. *C. Fistula* L., T. 13860 — 128. *C. marginata* ROXB., T. 13757 — 129. *C. megalantha* DCNE, T. 13829 — 130. *C. Sophora* L., T. 13763; 200 m, D. 1662; D. 1826 — 131. *C. Tora* L., 350 m, D. 1708 — 132. *Cynometra ramiflora* L., T. 13840 — 133. *Mezoneurum pubescens* DESF., T. 13873 — 134. *Peltophorum pterocarpum* BACK., T. 13769, 13848.

Papilionaceae-Papilionatae.

135. *Abrus precatorius* L., 250 m, D. 1686 — 136. *Cajanus* *Cajan* DRUCE, 400 m, D. 1789 — 137. *Canavalia maritima* THOU., D. s. n. — 138. *Cantharospermum volubile* MERR., D. 1936 — 139. *Clitoria Ternatea* L., D. s. n. — 140. *Crotalaria ferruginea* GRAH., 400 m, D. 1800; D. 1849 — 141. *C. striata* DC., D. 1305, 1946 — 142. *Derris elegans* BENTH., T. 13838 — 143. *D. elliptica* BENTH., T. 13641 — 144. *D. multiflora* BENTH., T. 13603 — 145. *D. scandens* BENTH., D. 1790, 1892 — 146. *Desmodium laxiflorum* DC., 300 m, D. 1655 — 147. *D. umbellatum* DC., D. 1940 — 148. *D. zonatum* MIQ., 400 m, D. 1794 — 149. *Dioclea*

javanica BENTH., 500 m, D. 1775 — 150. Dolichos falcatus KLEIN, 400 m, D. 1802 — 151. Dunbaria circinalis BAKER, 300 m, D. 1692 — 152. Flemingia strobilifera R. BR., 200 m, D. 1824 — 153. Inocarpus edulis FORST., T. 13623, 13874 — 154. Mucuna pruriens DC., 500 m, D. 1776 — 155. Phylaceum bracteosum BENN., D. 1756 — 156. Pongamia pinnata MERR., T. 13909; D. 1942, 1947 — 157. Pseudarthria viscida W. et A., D. 1871 — 158. Psophocarpus tetragonolobus DC., D. 1788 — 159. Rynchosia acuminatissima MIQ., 400 m, D. 1795 — 160. Sesbania grandiflora PERS., D. 1926 — 161. Tephrosia purpurea PERS., 200 m, D. 1664 — 162. Teramnus labialis SPRENG., D. 1691 — 163. Uraria lagopodioides DESV., 350 m, D. 1818 — 164. U. species, D. 1915.

Elaeagnaceae.

165. Elaeagnus species, T. 13648.

Lythraceae.

166. Pemphis acidula FORST., T. 13891, 13923; D. 1939.

Sonneratiaceae.

167. Sonneratia alba SM., D. s. n.

Rhizophoraceae.

168. Bruguiera caryophylloides BL., D. 1923 — 169. B. gymnorrhiza LAMK., T. 13817 — 170. Ceriops Candolleana ARN., T. 13921; D. 1927 — 171. Rhizophora mucronata LAMK., T. 13816 — 172. R. stylosa GRIFF., T. 13814.

Combretaceae.

173. Lumnitzera racemosa WILLD., D. 1935 — 174. Terminalia Cattappa L., D. s. n. — 175. T. edulis BLANCO, T. 13839.

Myrtaceae.

176. Eugenia Cumini MERR., T. 13619 — 177. E. malaccensis LAMK., D. 1305 — 178. E. polyccephala MIQ., T. 13760 — 179. E. Reinwardtiana DC., D. 1920 — 180. E. species, D. 1907 — 181. E. species, 300 m, D. 1676 — 182. Psidium Guajava L., D. s. n.

Melastomataceae.

183. Melastoma Malabathricum L., 550 m, D. 1730 — 184. Meme-cylon species, T. 13600.

Oenotheraceae.

185. Ludwigia parviflora ROXB., 200 m, D. 1819.

Malvaceae.

186. *Abutilon indicum* Sw., 100 m, D. 1876 — 187. *Gossypium obtusifolium* Roxb., D. s. n. — 188. *Hibiscus tiliaceus* L., T. 13761; 200 m, D. 1836; 500 m, D. 1752 — 189. *Sida acuta* BURM., D. 1838 — 190. *S. rhombifolia* L., 300 m, D. 1693 — 191. *Thespesia Lampas* DALZ. et GIBBS., 200 m, D. 1821 — 192. *Urena lobata* L., 550 m, D. 1763.

Tiliaceae.

193. *Grewia acuminata* JUSS., D. 1916 — 194. *G. laevigata* VAHL, T. 13646; D. 1823; 50 m, D. 1882; 500 m, D. 1784 — 195. *G. multiflora* JUSS., T. 18037 — 196. *Triumfetta indica* LAMK., D. 1305, 1845, 1885.

Sterculiaceae.

197. *Kleinhovia hospita* L., 50 m, D. 1874 — 198. *Pterospermum acerifolium* WILLD., 250 m, D. 1683 — 199. *Sterculia* species, D. 1918.

Elaeocarpaceae.

200. *Elaeocarpus floribundus* BL., D. 1753.

Oxalidaceae.

201. *Biophytum sensitivum* DC., D. 1943.

Malpighiaceae.

202. *Hiptage benghalensis* KURZ, T. 13821.

Rutaceae.

203. *Evodia* species, 600 m, D. 1740 — 204. *Glycosmis cochinchinensis* PIERRE, T. 13595 — 205. *Micromelum pubescens* BL., T. 13826.

Simarubaceae.

206. *Brucea amarissima* MERR., T. 13898, 13907.

Burseraceae.

207. *Canarium commune* L., D. s. n.

Meliaceae.

208. *Aglaia argentea* BL., T. 13854; 100 m, D. 1667 — 209. *Dysoxylum amooroides* MIQ., T. 13859 — 210. *D. arborescens* MIQ., 500 m, D. 1759, 1787 — 211. *D. species*, 500 m, D. 1703.

Anacardiaceae.

212. *Buchanania arborescens* BL., T. 13858; 250 m, D. 1679 — 213. *Mangifera indica* L., D. s. n. — 214. *Semecarpus gigantifolius* VIDAL, T. 13583; D. 1942.

Sapindaceae.

215. *Allophyllus* Cobbe BL., D. 1899 — 216. *Arytera littoralis* BL., D. 1921 — 217. *Cardiospermum Halicacabum* L., 200 m, D. 1663 — 218. *Dodonaea viscosa* JACQ., T. 13852; D. 1944 — 219. *Schleichera trijuga* WILLD., T. 13626, 13764.

Celastraceae.

220. *Evonymus javanicus* BL., D. 1739.

Rhamnaceae.

221. *Colubrina asiatica* BROGN., T. 13615 — 222. *Gouania javanica* MIQ., 100 m, D. 1887 — 223. *Zizyphus celtidifolia* BL., 100 m, D. 1875 — 224. *Z. Oenoplia* MILL., 200 m, D. 1837.

Vitaceae.

225. *Ampelocissus aculeata* PLANCH., T. 13924 — 226. *A. arachnoidea* PLANCH., T. 13858 — 227. *Cissus adnata* ROXB., T. 13634; 550 m, D. 1760 — 228. *C. discolor* VENT., 300 m, D. 1656 — 229. *C. hastata* PLANCH., 500 m, D. 1778 — 230. *C. nodosa* BL., 200 m, D. 1665 — 231. *C. repanda* VAHL., 400 m, D. 1853 — 232. *Leca aequata* L., 400 m, D. 1846 — 233. *L. angulata* KORTH., 550 m, D. 1767 — 234. *L. rubra* BL., T. 13865 — 235. *Vitis flexuosa* THUNB., T. 13857.

Cornaceae.

236. *Alangium sundanum* MIQ., 600 m, D. 1726.

Araliaceae.

237. *Schefflera elliptica* HARMS., 400 m, D. 1700 — 238. *S. species*, 600 m, D. 1728.

Plumbaginaceae.

239. *Plumbago zeylanica* L., 50 m, D. 1890.

Myrsinaceae.

240. *Aegiceras floridum* R. et SCH., T. 13813 — 241. *Embelia philippinensis* DC., 500 m, D. 1734 — 242. *Maesa indica* WALL., 150 m, D. 1844.

Ebenaceae.

243. *Diospyros ellipticifolia* BAKH., T. 13645, 13686; Z. 3325; 400 m, D. 1796 — 244. *D. malabarica* KOSTEL., T. 13900 — 245. *D. maritima* BL., T. 13910 — 246. *D. montana* ROXB., T. 13914.

Convolvulaceae.

247. *Ipomoea gracilis* R. BR., 550 m, D. 1736 — 248. *Erycibe paniculata* ROXB., T. 13596 — 249. *Ipomoea Pes-caprae* SWEET, D. 1865 — 250. *Merremia hastata* HALL. f., T. 13888; D. 1910 — 251. *M. vitifolia* HALL. f., 300 m, D. 1702 — 252. *Stictocardia* species, Z. 3327.

Borraginaceae.

253. *Cordia Myxa* L., D. 1919 — 254. *Ehretia laevis* ROXB., D. 1917 — 255. *Tournefortia argentea* L. f., D. 1906.

Solanaceae.

256. *Datura fastuosa* L., T. 18033; 20 m, D. 1673.

Scrophulariaceae.

257. *Ilysanthes* species, 400 m, D. 1801.

Bignoniaceae.

258. *Dolichandrone spathacea* SCHUM., T. 13861; D. 1305.

Acanthaceae.

259. *Asystasia intrusa* BL., 50 m, D. 1900; 250 m, D. 1682; 400 m, D. 1847 — 260. *Barleria Prionitis* L., D. 1911 — 261. *Hypoestes* species, 250 m, D. 1687 — 262. *Josephinia imperatricis* VENT., T. 18034 — 263. *Justicia Gendarussa* BURM. f., T. 13855 — 264. *Lepidagathis javanica* BL., T. 13643; D. 1902 — 265. *Pseuderanthemum diversifolium* MIQ., T. 13590; 250 m, D. 1680 — 266. *Ruellia repens* L., D. 1650, 1698 — 267. *Thunbergia fragrans* ROXB., 500 m, D. 1738.

Verbenaceae.

268. *Avicennia officinalis* L., D. 1934 — 269. *Clerodendron inerme* GAERTN., D. 1305, 1947 — 270. *Gmelina asiatica* L. var. *villosa* BAKH., T. 13845; 550 m, D. 1750 — 271. *Lantana Camara* L., D. 1674 — 272. *Vitex parviflora* JUSS., T. 13813 — 273. *V. trifolia* L., D. 1710, 1863.

Labiatae.

274. *Coleus atropurpureus* BENTH., 50 m, D. 1888 — 275. *Cymaria acuminata* DECNE., 50 m, D. 1883 — 276. *Hyptis capitata* JACQ., 550 m, D. 1762 — 277. *H. suaveolens* PORT., T. 13796.

Loganiaceae.

278. *Strychnos septemnervis* CLARKE, 550 m, D. 1743.

Apocynaceae.

279. *Aganosma marginata* (L. DON., T. 13872 — 280. *Anodendron tenuiflorum* MIQ., T. 13614 — 281. *Cerbera manghas* L., D. 1303 — 282. *Kopsia flavida* BL., 400 m, D. 1696 — 283. *Ochrosia* species, D. 1896 — 284. *Rauwolfia amsoniifolia* DC., T. 13833, 13863, 13882, 13913; Z. 3322; D. 1867 — 285. *Tabernaemontana floribunda* BL., 200 m, D. 1831 — 286. *Wrightia calycina* DC., T. 13602; 300 m, D. 1813.

Asclepiadaceae.

287. *Aselepias curassavica* L., 200 m, D. 1666 — 288. *Ceropegia curviflora* HASSK., 50 m, D. 1671 — 289. *Cynanchum carnosum* SCHLTR., D. 1929 — 290. *C. species*, 250 m, D. 1689; 550 m, D. 1768 — 291. *Dioschidia Rafflesiana* WALL., D. 1895 — 292. *Gymnanthera paludosa* BL., D. 1930 — 293. *Secamone* species, D. 1938 — 294. *Tylophora exilis* COLEBR., 300 m, D. 1713.

Rubiaceae.

295. *Azima sarmentosa* B. et H., T. 13905; D. 1925 — 296. *Coffea* species, 500 m, D. 1777 — 297. *Guettarda speciosa* BL., T. 18035 — 298. *Morinda tinctoria* ROXB., T. 13880 — 299. *Oldenlandia corymbosa* L., 200 m, D. 1830 — 300. *O. paniculata* L., D. 1992 — 301. *Pavetta indica* L., 400 m, D. 1705 — 302. *Petunga longifolia* DC., 500 m, D. 1766 — 303. *Psychotria* species, 300 m, D. 1706 — 304. *Tarenna saleirensis* VALETON, T. 13640.

Cucurbitaceae.

305. *Benincasa hispida* COGN., 200 m, D. 1820, 1893 — 306. *Lagenaria leucantha* RUSBY., D. s. n. — 307. *Melothria perpusilla* COGN., 400 m, D. 1698.

Compositae.

308. *Blumea balsamifera* DC., 250 m, D. 1815 — 309. *B. chinensis* DC., 350 m, D. 1707 — 310. *Crepis japonica* BENTH., 400 m, D. 1803 — 311. *Elephantopus scaber* L., 250 m, D. 1701 — 312. *Gynura sarmentosa* DC., T. 13609 — 313. *Mikania cordata* B. L. ROBINSON, 400 m, D. 1711 — 314. *Pterocaulon sphacelatum* BENTH. et Hook.f., T. 13887 — 315. *Senecio sonchifolius* MOENCH., 300 m, D. 1814 — 316. *Vernonia actaea* KOST., D. 1937 — 317. *V. erigeroides* DC., T. 13878, 13880; 200 m, D. 1834 — 318. *Wedelia biflora* DC., T. 13599, 13922; D. s. n. — 319. *W. species*, 400 m, D. 1799.

*Angiospermae-Monocotyledonae.**Hydrocharitaceae.*

320. *Enhalus acoroides* STEUD., T. 18027.

Potamogetonaceae.

321. *Cymodocea ciliata* EHRENB., T. 13917.

Liliaceae.

322. *Smilax zeylanica* L., 200 m, D. 1650; D. 1839.

Pontederiaceae.

323. *Monochoria vaginalis* PRESL, 400 m, D. 1804.

Dioscoreaceae.

324. *Dioscorea alata* L., Z. 1171 — 325. *D. oppositifolia* L., 250 m, D. 1688 — 326. *D. triphylla* L., T. 13866.

Cyperaceae.

327. *Cyperus distans* L. f., T. 13820, 13876 — 328. *C. pennatus* LAMK., T. 13919; D. 1858 — 329. *C. stoloniferus* RETZ, D. 1945 — 330. *Fimbristylis annua* R. et SCH., T. 13822; 300 m, D. 1718 — 331. *F. spathacea* ROTH., D. 1861 — 332. *Kyllinga monocephala* ROTTB., D. 1857 — 333. *Scleria multifoliata* BOECK., 400 m, D. 1854.

Gramineae.

334. *Apluda mutica* L., 150 m, D. 1843 — 335. *Asthenochloa tenera* BUSE, 100 m, D. 1880 — 336. *Centotheca latifolia* TRIN., 50 m, D. 1670 — 337. *Imperata cylindrica* P. B., D. s. n. — 338. *Monerma repens* P. B., Z. 1083 — 339. *Oplismenus compositus* P. B., 200 m, D. 1658 — 340. *Panicum colonum* L., 500 m, D. 1782 — 341. *Pogonatherum panicum* HACK., T. 13819 — 342. *Spinifex littoreus* MERR., D. 1864 — 343. *Sporolobus diander* P. B., 200 m, D. 1684.

Cannaceae.

344. *Canna indica* L., 50 m, D. 1878.

Orchidaceae.

345. *Calanthe veratrifolia* R. BR., 550 m, D. 1771 — 346. *Cymbidium Finlaysonianum* LINDL., 250 m, D. 1685 — 347. *Dendrobium crumenatum* Sw., T. 13818 — 348. *Habenaria* species, 500 m, D. 1677 — 349. *Liparis* species, D. 1369 — 350. *Microstylis latifolia* J. J. S., 300 m, D. 1717 — 351. *Tropidia* species, D. 1372.

Palmae.

352. *Areca Catechu* L., D. s. n. — 353. *Arenga pinnata* MERR., D. s. n. — 354. *Borassus flabellifer* L., T. s. n. — 355. *Cocos nucifera* L., D. s. n. — 356. *Corypha Utan* LAMK., T. s. n. — 357. *Nipa fruticans* WURMB, D. s. n.

Araceae.

358. *Pothos Korthalsi* SCHOTT., 300 m, D. 1651.

Pandanaceae.

359. *Pandanus tectorius* SOL., D. s. n. — 360. *Pandanus* species, 600 m, D. s. n.

6. THE ISLAND OF KAJOEADI.

This is a small, oblong island; the direction of the longitudinal axis is NW to SE. It consists of raised coral rocks, only along the coast occur a few level patches, the rest is hilly; the tops are, from north to south: Bonélambère, Boehangpararang, and Tandjoenglipang, which are from 150 to 200 m high. There are only narrow strips of sandy beach, otherwise the coast is formed by raised coral reefs, fanciful and full of grottos. There are a few small campongs, the inhabitants of which live by fishing. Round the campongs are small fields where cocos, maize and *Musa* are cultivated. For the rest the island is covered with a thin-stemmed wood, and with shrubs. The soil consists for the greater part of limestone rocks, which are eroded in a very fantastic manner, so that points and blocks of the coral rocks stick out everywhere above the thin layer of humus. Where this layer is not too thin the wood is cleared and maize and *Cucurbitaceae* are cultivated. The plants stand in hollows between the coral rocks, often very far apart.

The remaining wood consisted for the greater part of young, non-flowering trees; epiphytes were not present, and lianas were very sparse. Mangrove was also absent. On the coral rocks near the sea I found a species of *Vernonia* with fleshy leaves and beautiful, purple capitula, *V. actaea*; the *Pescaprae* and *Barringtonia* associations were very poorly developed.

Plants found in the island of Kajoeadi.

Dicotyledonae.

1. *Fatoua japonica* BL., D. 1812 — 2. *Ficus retusa* L., D. 1306 — 3. *Fleurya ruderalis* GAUD., 200 m, D. 1327 — 4. *Deeringia amarantoides* MERR., 150 m, D. 1329 — 5. *Macaranga Tanarius* MUELL.-ARG., D. 1333,

1340 — 6. *Mallotus moluccanus* MUELL.-ARG., 150 m, D. 1328 — 7. *Aristolochia Rumphii* KOSTEL., 100 m, D. 1336 — 8. *Anamirta Cocculus* W. et A., 300 m, D. 1324 — 9. *Acacia* species, D. 1325 — 10. *Abrus precatorius* L., D. 1345 — 11. *Pongamia pinnata* MERR., D. 1314 — 12. *Glycosmis cochinchinensis* PIERRE, D. 1341 — 13. *Triumfetta indica* LAMK., D. 1307 — 14. *Kleinhovia hospita* L., D. 1346 — 15. *Pterospermum acerifolium* WILLD., D. 1326 — 16. *Brucea amarissima* MERR., D. 1332 — 17. *Munronia javanica* BENN., 200 m, D. 1339 — 18. *Gymnosporia montana* LAWS., D. 1316 — 19. *Tetrastigma lanceolarium* PLANCH., D. 1344 — 20. *Calonyction* species, D. 1308 — 21. *Ipomoea Pes-caprae* SWEET, D. 1310 — 22. *Jacquemontia paniculata* HALL. f., 100 m, D. 1330 — 23. *Josephinia imperatricis* VENT., D. 1313 — 24. *Asystasia intrusa* BL., D. 1321 — 25. *Clerodendron inerme* GAERTN., D. 1311 — 26. *Vitex parviflora* JUSS., D. 1309 — 27. *Leucas javanica* BENTH., D. 1318 — 28. *Tabernaemontana floribunda* BL., D. 1342 — 29. *Ceropegia curviflora* HASSK., D. 1337 — 30. *Cucumis Melo* L., D. 1331 — 31. *Cucurbita Pepo* L., 200 m, D. 1323 — 32. *Melothria perpusilla* COGN., D. 1334 — 33. *Scaevola frutescens* KRAUSE, D. 1317 — 34. *Senecio* species, D. 1319 — 35. *Vernonia actaea* KOST., D. 1320 — 36. *Wedelia biflora* DC., D. 1315.

Monocotyledonae.

37. *Dioscorea oppositifolia* L., 50 m, D. 1338 — 38. *Spinifex littoreus* MERR., D. s. n. — 39. *Cocos nucifera* L., D. s. n. — 40. *Pandanus tectorius* SOL., D. s. n.

7. THE ISLAND OF KALAOTOA.

This island is the most south easterly of the Salajar Archipelago. It is larger than Kajoeadi, but it displays the same particulars. The coast is formed for the greater part by raised coral formations with many caves; sandy beaches occur only here and there, the *Pescaprae* and *Barringtonia* associations are, consequently, scarcely developed. Mangrove is entirely absent. The interior of the island is hilly, and in the south-east it reaches a height of 320 m; a ridge, the tops of which reach up to 250 and 300 m, runs in the direction north to south. The soil consists of black earth with in between pointed coral rocks. In the south-west is a small fishermen's campong, surrounded by disorderly arable land, and behind this, deserted and weed-grown fields with young trees and low shrubs growing in them. The rest is covered with thin wood, only a few specimens of larger trees rising above them. One single epiphyte,

Polypodium punctatum, occurs in the higher parts, and there were also found two fructifying terrestrial orchids, *Liparis* and *Tropidia* species. A large liana, *Mucuna gigantea*, was remarkably common; the inflorescences consisted of a thin peduncle, about 1 m long, with at the end an accumulation of greenish white flowers. Many trees were cut down, but it appeared that they were not flowering, so that nothing can be recorded about the composition of the wood.

Plants found in the island of Kalaotoa.

Pteridophyta.

1. *Dryopteris pteroides* O. K., 300 m, D. 1378 — 2. *Polypodium punctatum* Sw., 150 m, D. 1374.

Dicotyledonae.

3. *Ficus Ampelos* BURM., D. 1376 — 4. *Phyllochlamys taxoides* KOORD., 200 m, D. 1381 — 5. *Trema orientale* (L.) BL., D. 1401 — 6. *Pipturus incanus* WEDD., D. 1400; 50 m, D. 1409 — 7. *Deeringia amaranthoides* MERR., D. 1402 — 8. *Acalypha Caturus* BL., 250 m, D. 1370 — 9. *Bridelia monoica* MERR., D. 1399 — 10. *Cyclostemon* species, 300 m, D. 1365 — 11. *Macaranga Tanarius* MUELL.-ARG., D. 1347 — 12. *Mallotus philippinensis* MUELL.-ARG., 50 m, D. 1407 — 13. *Pycnarrhena celebica* DIELS, 300 m, D. 1368 — 14. *Albizzia saponaria* BL., D. 1357 — 15. *Cassia timorensis* DC., D. 1398 — 16. *Desmodium laxiflorum* DC., 300 m, D. 1380 — 17. *Mucuna gigantea* DC., 300 m, D. 1371 — 18. *Phyllacium braeteosum* BENN., D. 1382 — 19. *Quisqualis sulcata* v. SL., D. 1405 — 20. *Abelmoschus moschatus* MEDIC., 50 m, D. 1385 — 21. *Abutilon indicum* Sw., 100 m, D. 1386 — 22. *Gossypium obtusifolium* ROXB., D. 1360 — 23. *Hibiscus hirtus* L., D. 1352 — 24. *Urena lobata* L., 150 m, D. 1383 — 25. *Dracontomelum mangiferum* BL., D. 1367 — 26. *Allophylus Cobbe* BL., D. 1356 — 27. *Erioglossum edule* BL., D. 1348 — 28. *Corchorus acutangulus* LAMK., D. 1361 — 29. *Grewia laevigata* VAHL, D. 1358 — 30. *Cardiopharyx lobata* WALL., D. 1395 — 31. *Gouania javanica* MIQ., 20 m, D. 1397 — 32. *Leea indica* MERR., 100 m, D. 1408 — 33. *Tetrastigma lanceolarium* PLANCH., D. 1411 — 34. *Ellipanthus* species, 300 m, D. 1364 — 35. *Maesa indica* WALL., D. 1359, 1404 — 36. *Cordia Myxa* L., D. 1406 — 37. *Tournefortia argentea* L. f., D. 1387 — 38. *T. sarmentosa* LINK., 200 m, D. 1384 — 39. *Asystasia intrusa* BL., D. 1351 — 40. *Hypoestes* species, D. 1388 — 41. *Lepidagathis* species, 200 m, D. 1377 — 42. *Ruellia repens* L., D. 1363 — 43. *Callicarpa longifolia* LAMK., D. 1349 — 44. *Clerodendron*

Blumea SCHAUER, D. 1375 — 45. *C. kalaotoense* H. J. LAM, D. 1373 — 46. *Premna integrifolia* L., D. 1540 — 47. *Vitex parviflora* JUSS., D. 1355 — 48. *Anisomeles indica* O. K., D. 1392 — 49. *Ceropegia curviflora* HASSK., D. 1389 — 50. *Cynaneum* species, D. 1354; 10 m, D. 1393 — 51. *Blumea balsamifera* DC., 100 m, D. 1379 — 52. *Vernonia patula* MERR., D. 1362 — 53. *Wedelia biflora* DC., D. 1390.

Monocotyledonae.

54. *Smilax zeylanica* L., D. 1410 — 55. *Dioscorea oppositifolia* L., D. 1394, 1396, 1403 — 56. *Oplismenus compositus* P. B., D. 1366 — 57. *Setaria verticillata* P. B., D. 1391 — 58. *Liparis* species, 250 m, D. 1363 — 59. *Tropidia* species, 300 m, D. 1372.

8. THE ISLAND OF BONERATE.

This island is populated somewhat denser than the other smaller islands of this archipelago, and consequently little is left of the original vegetation. The coast is for the greater part a steep coral coast, so that vegetations of beach plants have developed but sparsely. The country is hilly, and shelves away to the sea; the highest top is about 100 m above sea-level. Near the campongs is arable land, partly cultivated, partly deserted, and then covered with thin brushwood and grasses. Little is left of the forest, the trees are slender-stemmed, large trees are pretty well absent. Up to the highest points small woods alternate with monotonous vegetations of *Andropogon contortus*, with only here and there such shrubs as *Bridelia monoica*, *Glochidion rubrum*, *Capparis horrida*, and *Grewia laevigata*. BAKKER (1862, p. 215) mentions the presence of plains covered with thin grass and shrubs, and the absence of large trees, so that this island seems to have been disforested for quite a long time already. *Vernonia actaea*, *Vitex parviflora*, *Colubrina asiatica*, and *Pemphis acidula* grow scattered on the limestone rocks near the sea.

Plants collected in the island of Bonerate.

Dicotyledonae.

1. *Piper retrofractum* VAHL, D. 1463 — 2. *Achyranthes aspera* L., D. 1430 — 3. *Pupalia lappacea* MIQ., 100 m, D. 1466 — 4. *Anamirta Cocculus* W. et A., D. 1439 — 5. *Bridelia minutiflora* Hook.f., D. 1412 — 6. *B. monoica* MERR., D. 1414 — 7. *Cladogynos orientalis* ZIPP., D. 1449 — 8. *Euphorbia serrulata* REINW., D. 1417, 1441 — 9. *Glochidion rubrum* BL., D. 1413 — 10. *Macaranga Tanarius* MUELL.-ARG., D. 1436 — 11. *Cassytha filiformis* L., D. 1440 — 12. *Capparis horrida* L., D. 1457 —

13. *Adenia* species, D. 1431 — 14. *Albizzia saponaria* BL., 50 m, D. 1447 — 15. *Canavalia ensiformis* DC., D. 1443 — 16. *C. maritima* THOU., D. 1464 — 17. *Cantharospermum scarabaeoides* BAILL., D. 1450 — 18. *Clitorea Ternatea* L., D. 1434 — 19. *Mucuna gigantea* DC., 50 m, D. 1451 — 20. *M. pruriens* DC., D. 1458 — 21. *Vigna marina* MERR., D. 1425 — 22. *Pemphis acidula* FORST., D. 1422 — 23. *Abutilon crispum* Sw., D. 1460 — 24. *Hibiscus vitifolius* L., D. 1461 — 25. *Leea rubra* BL., D. 1462 — 26. *Grewia laevigata* VAHL., D. 1470 — 27. *Triumfetta indica* LAMK., s. n. — 28. *Helicteres Isora* L., D. 1427 — 29. *Pterospermum acerifolium* WILLD., D. 1448 — 30. *Ryssopteris tiliifolia* JUSS., D. 1432 — 31. *Colubrina asiatica* BROGN., D. 1456 — 32. *Gymnosporia montana* LAWS., D. 1419 — 33. *Diospyros maritima* BL., D. 1416 — 34. *Ipomoea Nil* ROTH., D. 1452 — 35. *Jacquemontia paniculata* HALL.f., 40 m, D. 1435 — 36. *Merremia hastata* HALL.f., 50 m, D. 1445 — 37. *Ipomoea Quamoelit* L., D. 1438 — 38. *Asystasia intrusa* BL., D. 1420 — 39. *Premna integrifolia* L., D. 1418 — 40. *Vitex parviflora* JUSS., D. 1426 — 41. *Coleus atropurpureus* BENTH., D. 1444 — 42. *Ixora timorensis* DECNE., D. 1459 — 43. *Adenostemna Lavenia* O. K., D. 1435 — 44. *Vernonia actaea* KOST., D. 1423 — 45. *V. erigeroides* DC., D. 1424 — 46. *Wedelia biflora* DC., D. 1421.

Monocotyledonae.

47. *Smilax zeylanica* L., D. s. n. — 48. *Dioscorea bulbifera* L., 50 m, D. 1453 — 49. *Andropogon contortus* L., 20 m, D. 1429 — 50. *Apluda mutica* L., D. 1433 — 51. *Imperata cylindrica* P. B., D. s. n. — 52. *Cocos nucifera* L., D. s. n.

9. THE PASITALOE ISLANDS.

These are three small coral islands, the largest being 1 kilometer long and three quarters of a kilometer broad, but slightly raised above the sea-level; the egg-hills only of the orange-legged Megapode, *Megapodius duperreyi* (LESS & GARN), form slight elevations of the soil. My hopes that these islands would be uninhabited were not realized; in one of the islands was a small campong, the central parts of the three islands were cultivated and many coco-nuts had been planted. High trees, such as occur in the coral islands north of Batavia, were lacking. The sandy beaches were covered with a few representatives of the *Pescaprae* association: *Euphorbia Atoto*, *Canavalia maritima*, *Tribulus cistoides*, *Ipomoea Pes-caprae*, *Wedelia biflora*, and *Spinifex littoreus*. The last plant particularly covered vast areas with close vegetations. *Sesuvium*

portulacastrum also grew on the sandy beach. *Casuarina equisetifolia* was numerous, but only as small specimens. *Guettarda speciosa* was the only common representative of the *Barringtonia* association, there were a great many specimens, particularly as shrubs. *Pemphis acidula* formed groves on this soil, which owing to blocks of coral stone was rich in limestone. *Pandanus tectorius* was found as large specimens.

Plants collected in the Pasitaloe Islands.

Dicotyledonae.

1. *Casuarina equisetifolia* L., D. 1475 — 2. *Deeringia amaran-toides* MERR., D. 1481 — 3. *Boerhaavia diffusa* L., D. 1480 — 4. *B. chi-nensis* DR., D. 1484 — 5. *Sesuvium portulacastrum* L., D. 1477 — 6. *Portulaca oleracea* L., D. 1474 — 7. *Euphorbia Atoto* L., D. 1465 — 8. *Canavalia maritima* THOU., D. s. n. — 9. *Polanisia viscosa* DC., D. 1472, 1482 — 10. *Pittosporum timorense* BL., D. 1471, 1485 — 11. *Pem-phiss acidula* FORST., D. 1479 — 12. *Tribulus cistoides* L., D. 1467 — 13. *Ipomoea Pes-caprae* SWEET, D. s. n. — 14. *Dielyptera* species, D. 1478 — 15. *Guettarda speciosa* L., D. 1473 — 16. *Muellerargia timoren-sis* COGN., D. 1468 — 17. *Melothria perpusilla* COGN., D. 1469 — 18. *Ver-nonias actaea* KOST., D. 1466 — 19. *Wedelia biflora* BL., D. s. n.

Monocotyledonae.

20. *Spinifex littoreus* MERR., D. s. n. — 21. *Cocos nucifera* L., D. s. n. — 22. *Pandanus tectorius* SOL., D. s. n.

10. THE ISLAND OF KALAO.

When seen from the sea the island seems to be entirely covered with virgin forests. There are a few unimportant settlements, surrounded by small fields. The coast is, for the greater part, rocky, only here and there small, white beaches are visible. Mangrove has developed but slightly; it is found here and there along the mouths of small rivers. In the north-west a rather vast area is covered with teak-forest, which owing to the light colour of the inflorescences stands out clearly against the virgin forest. I had an opportunity to make an excursion to this teak-forest and one along the south coast of this island. The teak-forest was a pretty well pure wood, it was mixed with but few other species of trees; the ground was densely covered with various species of shrubs, such as are regularly met with in the teak-forests in Java: species of *Glochidion*, *Grewia laevigata*, and other species which were not flowering. Along the south coast the wood reached down to the sea; on the steep

rocky coasts were many specimens of *Cycas Rumphii*, and on the sandy patches various beach plants. Epiphytes were rare in the part I visited. I do not possess any data about the composition of the wood.

Plants found in the island of Kalao.

Pteridophyta.

1. *Selaginella plana* Hieron., 50 m, D. 1490 — 2. *Acrostichum aureum* L., D. 1511 — 3. *Adiantum lunulatum* Burm., D. 1489 — 4. *Asplenium adiantoides* C. Chr., D. 1524 — 5. *Cyclophorus lanceolatus* Alston, D. 1542 — 6. *Diacalpe aspidioides* Bl., 100 m, D. 1499 — 7. *Dryopteris extensa* O. K., 100 m, D. 1498 — 8. *Polypodium punctatum* Sw., D. 1534.

Gymnospermae.

9. *Cycas Rumphii* Miq., D. 1531.

Ang.-Dicotyledonae.

10. *Casuarina equisetifolia* L., D. 1511, 1516, 1536 — 11. *Pipturus incanus* Wedd., 150 m, D. 1500 — 12. *Piper bantamense* Bl., 50 m, D. 1487 — 13. *Boerhaavia diffusa* L., D. 1527 — 14. *Acalypha Caturus* Bl., 150 m, D. 1493 — 15. *Glochidion molle* Bl., D. 1518 — 16. *G. rubrum* Bl., D. 1522 — 17. *Macaranga Tanarius* Muell.-Arg., D. 1505 — 18. *Mallotus molluccanus* Muell.-Arg., D. 1506 — 19. *Pycnarrhena celebica* Diels, 50 m, D. 1488 — 20. *Litsea resinosa* Bl., D. 1509 — 21. *Caesalpinia Crista* L., D. 1543 — 22. *Desmodium laxiflorum* DC., D. 1521 — 23. *D. umbellatum* DC., D. 1517 — 24. *Sophora tomentosa* L., D. 1512, 1539 — 25. *Vigna marina* Merr., D. 1519 — 26. *Bruguiera caryophylloides* Bl., D. 1514 — 27. *Grewia laevigata* Vahl, 150 m, D. 1503 — 28. *Triumfetta indica* Lamk., D. 1535 — 29. *Hibiscus tiliaceus* L., D. 1530 — 30. *Sida acuta* Burm., D. 1525 — 31. *Thespesia populnea* Sol., D. 1538 — 32. *Ryssopteris tiliacifolia* Juss., 100 m, D. 1493 — 33. *Glycosmis cochinchinensis* Pierre, D. s. n. — 34. *Arytera littoralis* Bl., D. 1532 — 35. *Tetrastigma lanceolarium* Planch., D. 1544 — 36. *Ellipanthus species*, D. 1528 — 37. *Stictocardia species*, D. 1526 — 38. *Merremia hastata* Hall.f., D. 1533 — 39. *Cordia Myxa* L., D. 1541 — 40. *Tournefortia argentea* L.f., D. 1523 — 41. *T. sarmentosa* Link., D. 1502 — 42. *Asystasia intrusa* Bl., D. 1520 — 43. *Hemigraphis reptans* F. Anders., D. 1437 — 44. *Pseuderanthemum diversifolium* Miq., 50 m, D. 1432 — 45. *Premna integrifolia* L., D. 1540 — 46. *Tectona grandis* L.f., D. s. n. — 47. *Vitex Negundo* L., D. 1513 — 48. *Hyptis capitata*

JACQ., D. 1544 — 49. *Alstonia scholaris* R. BR., D. 1510 — 50. *Personsia Cumingiana* DC., D. 1515 — 51. *Adenostemna Lavenia* O. K., 50 m, D. 1491 — 52. *Wedelia biflora* DC., D. 1532.

Monocotyledonae.

53. *Crinum asiaticum* L., D. 1545 — 54. *Centotheca latifolia* TRIN., 100 m, D. 1501 — 55. *Thuarea involuta* R. BR., D. 1537 — 56. *Scleria multiflora* BOECK., D. 100 m, D. 1504 — 57. *Peristylus goodyeroides* LINDL., 100 m, D. 1495 — 58. Orchidaceae, 100 m, D. 1496.

11. THE ISLAND OF DJAMPEA.

This is the second largest island of the group, and the soil consists of older rocks (see paragraph 3). In this island one would expect a different and a richer flora than in the other islands which consist for the greater part of younger rock formations. Therefore I made several and longer excursions in this island, but the results did not come up to the expectations. Here too epiphytes are rare, and so were lianas. On the coasts are several campongs, the surroundings consisting of small fields and vast grass wildernesses, mainly covered with *Imperata cylindrica*. The hills in the interior, however, are covered with old virgin forest, which has a remarkable habitus; it consists of large trees with little undergrowth, so that the wood could easily be penetrated into, but the results of the botanical investigation were extremely poor, because the large trees could not be felled. At an altitude of about 300 m the surroundings began to be somewhat moistier; a small species of *Begonia* was common here and there, but here too epiphytes were so to speak absent. The liana *Mucuna gigantea* was common; the inflorescences hung down from the crowns of the trees, the peduncles were 15 to 20 m long, or even longer, and at the end was the inflorescence proper with its greenish white flowers and brown fruits, about 1½ to 2 m above the ground. Living water was restricted to a few rivulets, which, however, entirely run dry in the dry season. Here and there, particularly in the lower parts of the hills, the undergrowth of the wood consisted of dense rattan wildernesses. The ground is, for the greater part, bare and dry, and covered with dry leaves, the layer of humus is thin.

Here and there are a few sandy beaches, and on the west side is a very vast mangrove vegetation, which, however, consists of relatively few species. Many trees of the mangrove had developed into robust specimens. Mangrove also occurs, although to a lesser extent, on the south coast near the campong Marégé.

Plants found in the island of Djampea.

Pteridophyta.

1. *Lygodium flexuosum* Sw., 20 m, D. 1578 — 2. *Adiantum lunulatum* BURM., D. 1636 — 3. *Anthrophium callifolium* BL., D. 1558 — 4. *A. immersum* METT., D. 1566 — 5. *Asplenium adiantoides* C. CHR., D. 1569, 1596 — 6. *A. Nidus* L., 400 m, D. s. n. — 7. *Dryopteris concolor* KUHN, D. 1622 — 8. *D. mollis* Hieron., D. 1559 — 9. *Hemigramme latifolia* COPEL., 150 m, D. 1620 — 10. *Leptochilus virens* C. CHR., 150 m, D. 1621 — 11. *Pteris quadriaurita* RETZ., 200 m, D. 1616, 1629 — 12. *P. cretica* L., D. 1635 — 13. *P. ensiformis* BURM., D. 1561, 1619.

Dicotyledonae.

14. *Ficus retusa* L., D. 1590 — 15. *Phyllochlamys taxoides* KOORD., D. 1615 — 16. *Piper bantamense* BL., D. 1625 — 17. *P. betle* L., D. 1097 — 18. *P. caninum* BL., D. 1637 — 19. *P. retrofractum* VAHL, D. 1627 — 20. *P. sarmentosum* ROXB., D. 1552 — 21. *Cyathula prostrata* BL., D. 1614 — 22. *Boerhaavia diffusa* L., D. 1603 — 23. *Portulaca oleracea* L., D. 1638 — 24. *Codiaeum Stellingianum* WARB., 400 m, D. 1566, 1567 — 25. *C. Cumingii* MUELL.-ARG., D. 1613 — 26. *Anomianthus auritus* BACK., D. 1643 — 27. *Unona discolor* VAHL, D. 1546, 1579, 1624 — 28. *Stephania Forsteri* A. GRAY, D. 1626 — 29. *Begonia* species, 300 m, D. 1568 — 30. *Tetracera scandens* MERR., D. 1640 — 31. *Pithecolobium umbellatum* BENTH., D. 1598 — 32. *Caesalpinia Nuga* ART., D. 1591 — 33. *Cassia alata* L., D. 1574 — 34. *C. occidentalis* L., D. 1548 — 35. *Canavalia ensiformis* DC., D. 1655 — 36. *Indigofera suffruticosa* MILL., D. 1606 — 37. *Desmodium umbellatum* DC., D. 1517 — 38. *Mucuna gigantea* DC., 100 m, D. s. n. — 39. *Pongamia pinnata* MERR., D. 1650 — 40. *Psophocarpus tetragonolobus* DC., D. 1581 — 41. *Sophora tomentosa* L., D. 1512, 1539 — 42. *Cynometra ramiflora* L., D. 1570 — 43. *Terminalia Catappa* L., D. 1594, 1599 — 44. *Sonneratia alba* SM., D. 1654 — 45. *Ludwigia parviflora* ROXB., D. 1575 — 46. *Bruguiera caryophylloides* BL., D. 1642 — 47. *B. gymnorrhiza* LAMK., D. 1641 — 48. *Rhizophora mucronata* LAMK., D. 1649 — 49. *R. stylosa* GRIFF., D. 1618 — 50. *Hibiscus surattensis* L., D. 1557 — 51. *H. tiliaceus* L., D. 1573, 1600; 300 m, D. 1571 — 52. *Sida cordifolia* L., D. 1645 — 53. *S. thyrsiflora* Mq., D. 1586 — 54. *Pterospermum acerifolium* WILLD., D. 1623 — 55. *Micromelum pubescens* BL., D. 1550 — 56. *Glycosmis cochinchinensis* PIERRE, D. s. n. — 57. *Canarium commune*

L., D. 1551 — 58. *Xylocarpus moluccensis* ROEM., D. 1588 — 59. *Cardiopteris lobata* WALL., D. 1612 — 60. *Cissus adnata* ROXB., D. 1589 — 61. *Leea angulata* KORTH., D. 1631 — 62. *Tetrastigma lanceolarium* PLANCH., D. 1553 — 63. *Aegiceras floridum* R. et SCH., D. 1593, 1653 — 64. *Embelia philippinensis* DC., D. 1549 — 65. *Diospyros maritima* BL., D. 1587 — 66. *Stictocardia* species, D. 1595 — 67. *Merremia hastata* HALL.f., D. 1604 — 68. *Cordia Myxa* L., D. 1601 — 69. *Physalis minima* L., D. 1639 — 70. *Limnophila* species, D. 1585 — 71. *Torenia* species, D. 1634 — 72. *Josephinia imperatricis* VENT., D. 1560 — 73. *Acanthus ilicifolius* L., D. 1646 — 74. *Pseuderanthemum diversifolium* MIQ., D. 1584 — 75. *Ruellia repens* L., D. 1577 — 76. *Clerodendron Blumeum* SCHAUER, D. 1630 — 77. *C. inerme* (GAERTN., D. 1652 — 78. *Vitex pubescens* VAHL, D. 1592 — 79. *Coleus atropurpureus* BENTH., D. 1651 — 80. *Hyptis capitata* JACQ., D. 1554, 1644 — 81. *H. suaveolens* POIT., D. 1647 — 82. *Alstonia scholaris* R. BR., 300 m, D. 1572 — 83. *Rauwolfia amsoniifolia* DC., 50 m, D. 1628 — 84. *Gymnanthera paludosa* BL., D. 1643 — 85. *Geophila herbacea* O. K., D. 1610 — 86. *Ophiorrhiza neglecta* BL., 400 m, D. 1573 — 87. *Coccinea cordifolia* COGN., D. 1582 — 88. *Melothria perpusilla* COGN., D. 1576 — 89. *Momordica Charantia* L., 30 m, D. 1583 — 90. *Ageratum conyzoides* L., D. 1605 — 91. *Erigeron linifolius* WILLD., D. 1611.

Monocotyledonae.

92. *Aneilema nudiflorum* R. BR., 60 m, D. 1632 — 93. *Cyperus diffusus* VAHL, 300 m, D. 1564 — 94. *C. dilutus* VAHL, D. 1608 — 95. *Centotheca latifolia* TRIN., 200 m, D. 1562 — 96. *Eragrostis amabilis* O. K., D. 1607 — 97. *Imperata cylindrica* P. B., D. s. n. — 98. *Panicum trigonum* RETZ, D. 1580 — 99. *Calamus* species, 150 m, D. 1565 — 100. *Cocos nucifera* L., D. s. n. — 101. *Homalomena* species, D. 1617.

12. CONCLUSION.

We have seen from the descriptions of the vegetations of the various islands that the vegetation may be called relatively poor. It stands to reason that when the investigations will be resumed, and if more time is available, many names of plants will be added to the plant-lists. General conclusions may yet be drawn from what has been found so far. From the fact that the vegetation is so very poor we may infer that the soil is not very fertile, and from the extreme scarcity of epiphytes that the atmosphere is dry. On my numerous excursions in the Malay Archipelago I have never seen a place where epiphytes are so

scarce and have so poorly developed. The dry season prevails for a very long time (cf. paragraph 3 on the climate). In Bonerate are found vast wildernesses of *Andropogon contortus*, a species of grass which mainly occurs in places with a strongly prevailing east-monsoon. In the island situated most easterly, Kalaotoa, I found *Setaria verticillata*, a species of grass which, in the Netherlands Indies, is only found in the very dry island Soemba and on the extreme north-east of Java, where the east-monsoon is also strongly prevailing.

An other remarkable and rare species of grass, *Asthenochloa tenera*, (see HENRARD, 1929, p. 579) was collected at an altitude of about 100 m on a limestone hill in the southern part of Salajar. So far this grass has been found on the slopes of Mt Idjen in East Java, between 200 and 1000 m above sea-level, and in the Philippine Islands.

Remarkably small is the number of new species found in this territory which as yet has been investigated so very seldom. There will probably be new species among the *Orchidaceae* which have not yet been identified, and it is likely that the *Begonia* found in Djampea is also an unknown species. The following new species have been described as occurring only in Kalaotoa: *Clerodendron kalaotoense* H. J. LAM (LAM, 1919, p. 307) and *Quisqualis sulcata* v. SL. (VAN SLOOTEN, 1924, p. 61); a variety of this species: var. *subcordata* v. SL. (VAN SLOOTEN, 1924, p. 62) has been found in the island Wetar near Timor, so that *Q. sulcata* can hardly be called endemic. There are species which do not occur west of Celebes, for instance *Amylothea stenopetala* DANS. is known as occurring in Flores and has been found all over Celebes (see DANSER, 1931, p. 249); *Strophoblachia fimbricalyx* BOERL. is found in Indo China, and besides only in Celebes and the Philippine islands (see MERRILL, 1926, p. 96); *Vernonia actaea* KOST. is known as occurring in several islands of the Salajar group, and it can certainly not be called rare here, and besides it is found in the island Moena situated to the south-east of Celebes, the Toekangbesi islands, and the Tanimbar islands, see KOSTER (1935, p. 453), and thus I could enumerate a few others. The greater part of the plants, however, is found also in the western parts of the Malay Archipelago; a special relationship with the flora of the neighbouring island Celebes, which is very rich in endemic plants, could not be deduced from the findings. Almost all the plants are species with a wide distribution area.

From the above it may be concluded that the flora of these islands is relatively young, and consists mainly of elements which can easily be dispersed, which indeed are widely spread. The investigation of

Krakatau with its flora, the elements of which are at best 50 years old, has taught us that the immigrating plants are chiefly species with a wide distribution area. The flora of the Salajar islands is far older, but a comparison with the floras of islands such as Borneo and Celebes, both islands with many endemic plants, points to the young age of the flora of the Salajar islands. Geologically too they must be counted among the younger islands of the Malay Archipelago. The islands Djampea and Kalao may be exceptions to this statement, what is known of their floras yet consists of species with a wide distribution area.

The limestone in the soil, which in many islands is present up to the highest parts, must also be looked upon as a cause of the poorly developed vegetation. In the tropics these limestone formations do not bear a typical flora of calciphilous plants; there are a few plants which demand a certain amount of limestone in the soil, but according to VAN STEENIS (1935, p. 35) these are rather kremnophytic forest-plants growing in steep localities; the plants mentioned by him: *Epithema saxatile* BL., *Monophyllaea Horsfieldii* R. BR., and *Stauranthera ecalcarata* R. BR. were, in the Salajar islands, not even found in the grottos. In the well-known limestone caves near Maros (Makassar) in West-Celebes a species of *Monophyllaea* grows in great numbers. The investigation of the flora of Salajar also supports the opinion of VAN STEENIS (1935, p. 36): „I arrive at the conclusion that so far there are no or hardly any data which justify us in speaking of guiding plants for limestone in the Netherlands' Indies." See also VAN DER PIJL, 1933, p. 86.

For lack of data mangrove is not indicated in the islands of the Salajar group on the coloured vegetation map accompanying the above-mentioned article by VAN STEENIS. Mangrove is yet to be found in various islands, particularly on the west side. Tidal forests are on the whole of but small extent; in the island Djampea, however, a large, quiet bay is entirely bordered by one.

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KLIMACHARAKTER UND PFLANZENDECKE VON INSULINDE UND VON AUSTRALIEN

von

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(Wien).

EINLEITUNG.

Im 3. Heft des Jahrganges 1936 der Oesterreichischen Botanischen Zeitschrift veröffentlichte ich einen Aufsatz über „Klimacharakter und Pflanzendecke“ (14), in dem ich einen formelmässigen Ausdruck für die Ozeanität des Klimas aufzustellen versuchte. Ich nannte diesen Wert „Ozeanitätsindex“ und bestimmte ihn aus der Formel

$$\frac{n \cdot \frac{1}{2} (f_a - f_i)}{(t + 20) \cdot \sqrt{t_a - t_i}},$$

wobei n die Niederschlagssumme des Jahres in cm, f_a das Maximum und f_i das Minimum der relativen Luftfeuchtigkeit, t die Jahresmitteltemperatur in Celsiusgraden und t_a das Mittel des wärmsten, t_i das Temperaturmittel des kältesten Monats bedeuten. Bei der kartographischen Darstellung der Ozeanität mit Hilfe dieses Wertes zeigte sich eine weitgehende Uebereinstimmung mit den grossen klimabedingten Formationen bzw. Unterformationen, die ich auch am Schlusse der Arbeit tabellarisch zusammenfasste (14, Seite 211/212).

Auf Grund dieser Skizze wandte sich im Herbst 1936 Herr Prof. Dr. H. J. LAM, Direktor des Rijksherbariums in Leiden, an mich mit der Anfrage, ob ich auf Grund ausführlicherer Daten, als mir bisher solche zur Verfügung standen, für Niederländisch-Indien die Ozeanitätsverteilung genauer bestimmen wolle; auf meine bejahende Antwort hin übermittelte mir Herr Direktor Dr. H. J. LAM im Wege des Botanischen Institutes zu Wien die meteorologischen Daten (1, 9, 21), die ich dann noch aus der Bibliothek der Zentralanstalt für Meteorologie und Geodynamik in Wien ergänzen konnte (2, 3, 11, 12). Dabei ergab sich auch die Möglichkeit, auf Australien Rücksicht zu nehmen, so dass ich dieses samt Neuseeland neuerlich in die Untersuchung miteinbezog; dazu wurde ich auch durch die Uebersendung einer ganz neuen Studie über die Vegetationsverhältnisse Australiens (19) bewogen,

die mir Herr WILLIAM HARTLEY, Assistent am Council for Scientific and Industrial Research, Division of Plant Industry, Canberra, übermittelte. Bevor ich an die Besprechung des Themas schreite, möchte ich auch hierorts allen jenen Stellen danken, die mich unterstützt haben, vor allem Herrn Direktor Dr. H. J. LAM (Leiden), Herrn Direktor Dr. F. KNOLL und Prof. Dr. B. SCHUSSNIG (Botanisches Institut Wien), Herrn W. HARTLEY (Canberra), Dr. F. STEINHAUSER (Zentralanstalt f. Meteorologie und Geodynamik in Wien) und Herrn Prof. A. GREGER (Elisabethgymnasium Wien), ohne deren Hilfe diese Studie nicht möglich gewesen wäre.

INSULINDE (Karten 1 u. 2).

Schon seinerzeit (14) hat es sich gezeigt, dass der grösste Teil einen Ozeanitätsindex von über 200 aufweist; nur auf den nördlichen Philippinen, auf den Kleinen Sunda-Inseln (Timor), auf den Inseln der Banda-See und auf Neu Guinea schien der Index auf 100 und darunter zu sinken, wozu wohl die grosse Landmasse Australiens mit ihrer geringen Ozeanität beitragen dürfte. Dieser Einfluss äussert sich auch deutlich in der raschen Abnahme der Ozeanität von West nach Ost auf Java (*Karte 1*). Während im Westen der Index im allgemeinen nur im Nordteile unter 300 auf grössere Strecken, am meisten in den Küstengebieten in Nord-Bantam, in Batavia und Cheribon, absinkt, liegt fast der ganze Osten etwa ab den Provinzen Rembang und Madioen in einer Zone unter 250, sogar unter 200. Diese Kontinentalitätszone umfasst ungefähr die Provinzen Rembang und Soerabaja sowie, mit Ausnahme der Vulkanberge, Madioen und Soerakarta und schliesslich den Norden von Kediri, Paseroean und Besoekei samt dessen Südspitze, der Halbinsel Blambangan (oder Poerwo); als niederster Wert ergab sich der Index von Asembagoes (Besoekei) mit 130. Die Südküste von Java ist im ganzen ozeanischer; im Westen unterschreitet der Index etwa bis an die Panandjoeng-Bucht und dann noch um Tjilatjap (Banjoemas) 500 nicht, ausgenommen an einem schmalen Streifen an der Wijnkoops-Bucht (Preanger), wo entlang des Tjitaroem und südlich des Pangerango-Massivs eine Zone mit Indices zwischen 300—500 herüberreicht, sowie an der Panandjoeng-Bucht, wo entlang des Tjitandoej etwa bis Poerwokerto und Bandjar ebenfalls Indices zwischen 300—500 vorherrschen. In Ost-Java zeigt die Südküste durchaus Werte unter 300, aber über 250, bloss östlich der Gradjagan-Bucht schliessen sich, wie schon erwähnt, sogar Werte unter 250 an. Nur südlich des G. Semeroe (Paseroean) und vom Idjen-Gebirge (Besoekei) her scheinen sich zwei Zonen über 300 bis ans Meer zu erstrecken, die

voneinander durch eine kontinentale Zone zwischen 250—300 entlang des Bondojoedo-Flusses getrennt werden.

Das Innere West-Javas etwa bis zu einer Linie zwischen Pekalongan im Norden und Karanganjar im Süden zeigt gegen das zentrale Gebirge zu immer höhere Werte, die im Pangerango-Gebiet im Süden 700 in Höhen über 3000 m weit überschreiten, ja im Norden bzw. Nordwesten sogar in geringeren Höhen, so zwischen 1100—1300 m, gegen 900 heranreichen. Auch das Gebirge nördlich von Bandoeng erreicht Werte gegen 700. Ebenso zieht sich eine Zone von über 700, die aber wahrscheinlich nicht geschlossen ist, wie dies mangels an Einzelwerten auf Karte 1 aufscheint, von den Bergen im Süden von Preanger (Kawah Tjiwidei) über den G. Galoenggoeng und über das Dieng-Plateau bis zur Talung von Magelang; vielleicht liegt auch der G. Merapi in dieser Zone, doch ergab sich hier kein einziger sicherer Wert zur Berechnung. Auffällig ist in West-Java auch die Umgebung von Bandoeng mit Indices knapp unter 200—250 als eine kontinentale Insel im Regenschatten der umgebenden bis 3000 m ansteigenden Gebirge.

In Ost-Java reichen die Indices selbst auf den Bergstationen, wie im Tengger-Gebirge (Pasoeroean) und am Argopoero, bzw. Jang-Plateau selbst in Höhen zwischen 1700—2200 m nicht mehr auf 500, ja vielfach nicht einmal auf 400, nur im Keloet-Gebirge an der Grenze von Kediri und Pasoeroean übersteigen sie in 1400 m Seehöhe noch knapp 500. Dementsprechend ist das ganze Gebiet weitaus kontinentaler mit Indices zwischen 130 im Norden und 490 im Inneren; inselhaft mit einer Ozeanität von meist nicht viel über 400—450 erheben sich die Bergkuppen. Der gleichen Kontinentalitätszone unter 250 ist auch ganz Madoera zuzurechnen.

Interessant ist auch eine Gegenüberstellung der Durchschnittswerte der Indices in bestimmten Höhen zwischen West- und Ost-Java, die folgende Tabelle zeigt; auf ihr fallen die erste und zweite Höhenstufe (unter 600 m) ungefähr mit der ersten Höhenregion nach JUNGHUHN, die dritte mit der 2. Region JUNGHUHNs zusammen (10).

Tabelle der durchschnittlichen Indices in bestimmten Höhenstufen.

Höhenstufe	Index in West-Java	Index in Ost-Java
0—300 m	390	260
300—600 m	515	430
600—1400 m	510	320
1400—2100 m	620	340
über 2100 m	770	(nur eine Station)

In beiden Fällen zeigt sich vorerst mit der Höhe eine Zunahme, dann ein Rückgang und schliesslich wieder ein Anstieg, eine Erscheinung, die BROCKMANN-JEROSCH (4) auch von den Schweizer Bergen angibt. Während jedoch im Westen bloss ein schwacher Rückgang zwischen 600—1400 m erfolgt, der, eigentlich innerhalb der vermutlichen Fehlergrenzen von 5 % gelegen (14), fast Null ist bzw. bei entgegengesetzt gerichteten Vorzeichen der mittleren möglichen Fehler überhaupt verschwindet, erreicht im Osten die Ozeanität ihren höchsten Wert zwischen 300—600 m und geht von hier bis 1400 m stark zurück, so dass auch bei Annahme von entgegengesetzten Vorzeichen der mittleren Fehler ein Abstieg um 70 bestehen bleibt. Im Westen steigt die Ozeanität nochmals bei ungefähr 1700 m stark an, im Osten dagegen über 1400 m nur schwach und ohne das frühere Maximum noch zu erreichen. Nach WARMING-GRAEBNER (20) tritt nun in West-Java der echte tropische Regenwald als Nebelwald in Höhen von ca. 1400—1800 m, im Osten dagegen bloss als Talwald und am Fusse der Berge auf. Die Pflanzengeographische Karte in VAN STEENIS (18) zeigt Regenwald (*primaire bosch, niet loofverliezend*) besonders in West-Java etwa bis zum Meridian 110° Ost, also in Gegenden, wo die Indices überall 300, ja meist 500 übersteigen. Oestlich der erwähnten Grenzlinie treten Regenwälder nur mehr sehr vereinzelt an den Vulkanbergen auf, so im Keloet-Gebirge, auf dem Ardjoeno, Tengger-Gebirge, Semeroe, Argopoero, Idjen-Gebirge usf., wo ja auch die Indices inselartig eben an den Gebirgen 300—400 überschreiten.

Nur auf der Nordseite von Java in den niedrigeren Teilen von Batavia, von Krawang angefangen über Cheribon und Pekalongan kommen bei Indices unter 300 bzw. 250 die Djati-Wälder (*Tectona grandis*) vor, die dann im kontinentaleren Osten tonangebend werden und heute noch namentlich in den Provinzen Semarang, Madioen, Rembang, Soerabaja sowie Pasoeroean und Besoekei und ehemals auch auf Madoera verbreitet sind bzw. waren, also durchwegs in Landschaften mit Indices vielfach unter 200, jedenfalls aber nicht über 300. Besonders auffällig ist die Uebereinstimmung der Verbreitung des Djati-Waldes mit der Ozeanitätslinie 250 und 300 nicht nur in Cheribon, sondern auch im Süden von Soerakarta und im Osten von Djokjakarta¹⁾, wohin ebenfalls bis gegen Wedi und dann an die Küste die Ozeanitätslinie 300 und in einigem Abstände nordwärts die Linie 250 nach Westen zurückspringt. Es ist klar, dass verschiedene Einzelheiten schon mit Rücksicht auf den Massstab der Karte und auf die Stationsdichte nicht zum Ausdruck

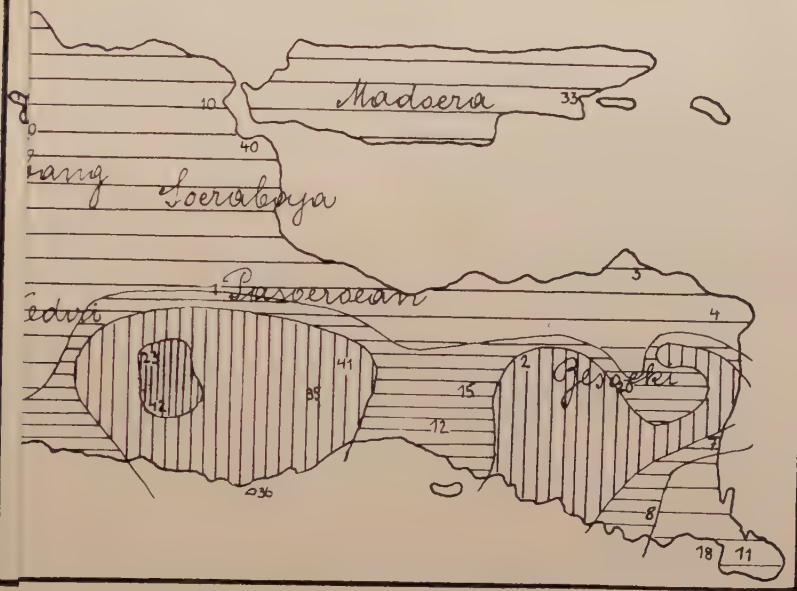
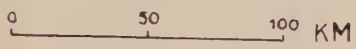
¹⁾ Auf Karte 1 steht irrtümlicherweise: Djojokarta.

kommen können, aber im allgemeinen ist die Uebereinstimmung mit den Angaben der VAN STEENIS'schen Karte (18) sehr gross. Nach WARMING-GRAEBNER (20) stellt die Type der Djati-Wälder, die nach Angabe mehreren Autoren hierher von Hinter-Indien verpflanzt worden sein sollen, eine Zwischenform zwischen den echten Regenwäldern (*Pluvilignosa*) und den regengrünen Monsunwäldern (*Hiemilignosa*) dar. Auf der Vegetationskarte von VAN STEENIS (18) sind die Tectona-Wälder von den anderen laubwechselnden Waldformationen (*gemengd loofverliezend bosch*) ausgeschieden; diese treten namentlich im Süden der beiden Provinzen Besoei und Pasoercean sowie auch in Kediri bei Indexzahlen ebenfalls unter 300, aber meist über 250 auf und weisen als Hauptvertreter verschiedene Akazien-Arten (*Acacia leucophloea*, *A. tomentosa*) und *Albizzia*-Arten u. a. auf. In der Karte von KOORDERS (10) ist der lichte Sekundärwald, der sich nach der Urwaldrodung und der Auffassung von Pflanzungen sowie auch aus der Strauch-, Gras- und Farnformation entwickelt, von den Savannen nicht geschieden; nach VAN STEENIS (18) ist der Sekundärwald fast ausschliesslich auf West-Java (Bantam, Preanger, namentlich um die Wijnkoops-Bucht) beschränkt, wo die Indices Regenwald anzeigen. Savannen (*savanne met palmen en heestergroepjes*) gibt es nach diesem Autor nur in Nordost- und Südost-Besoei (östlich Asembagoes und südlich Banjoewangi), wo die Indices zwischen 140 und 230 zu schwanken scheinen.

Die Vulkanberge im Osten Javas etwa ab dem Lawoe bzw. dem Merapi und Merbaboe besiedelt in der Bergregion auch Tjemara-Wald, vorwiegend aus *Casuarina montana* (= *Junghuhniana*); seine Höhenerstreckung nimmt von West nach Ost stark ab. Die Indices schwanken nach dem Kartenbild stark zwischen 300 und 200, dürften sich aber mit Rücksicht auf die Verschiedenheit auf Nord- und Südlagen im Durchschnitt eher dem unteren Werte nähern, da die Tjemara auf Nordseiten bis 1200 m, auf Südseiten bis 2000 m geht. Vielfach tritt auch die Bergtjemara in die Grasformation ein; diese findet sich in kontinentalen Gebieten wie in Ost-Java und auf Madoera, aber auch stellenweise im Westen nach Entwaldung (Brand) und Auflassung von Plantagen als eine Art von Strauch- und Grasformation (*struik-, gras- en varen-wildernis* nach VAN STEENIS), die vielfach in die Savanne übergeht. Namentlich im Osten ist die Alang-Alang-Formation mit *Imperata arundinacea* und *Saccharum spontaneum* verbreitet.

Stellenweise wie am Pangerango findet sich bei sehr hohen Indices und verhältnismässig niedrigen Jahresmitteln (unter 9° C) in grösserer Höhe auch eine Art alpiner Steppe.

JAVA



In der Umgebung von Bandoeng ist durch den Feldbau und Plantagenbau die ursprüngliche Vegetation bereits völlig vernichtet, so dass kein Schluss auf die natürliche Pflanzendecke mehr möglich ist; vermutlich dürften sich hier xerophile Formationen befunden haben.

Bei der Betrachtung der Ozeanitätsverteilung trat ein Umstand zutage, der dem Entwurf aller Karten zugute kam. Im Ost- und West-Java, wo verhältnismässig viele Stationen zur Indexberechnung herangezogen werden konnten, fiel das Gebiet mit einem Index unter 250 fast genau mit den Landschaften bis 200 cm Jahresniederschlag zusammen; ebenso deckte sich die Indexzone 250—500 annähernd mit der Niederschlagszone von 200—300 cm. Auch die Zone mit einem Index zwischen 500—700 bzw. 750 zeigte vielfach Ähnlichkeiten mit der Niederschlagszone von 300—400 cm. So konnte namentlich in Mittel-Java, aber auch auf den anderen Inseln, von wo nur sehr wenige Temperaturwerte zur Verfügung standen, die Ozeanitätskarte aus der Regenfallkarte vervollständigt werden, die ja für ganz Niederländisch-Indien sehr ausführlich vorliegt. Ich habe ferner auf Grund der mir zur Verfügung stehenden meteorologischen Daten (11) auch für die anderen tropischen Gebiete die hier gemachte Erfahrung überprüft und im grossen und ganzen bestätigt gefunden. Dagegen liegen in den kühl-gemässigten und ozeanischen Gebieten des pazifischen Nord- und Süd-Amerika die Indices in den entsprechenden Regenzonen niedriger, sobald die Jahresschwankung 10° übersteigt; bei geringerer Amplitude, wie an der chilenischen Küste, tritt auch hier die Uebereinstimmung auf.

An dieser Stelle möchte ich auch auf eine andere Uebereinstimmung hinweisen, die sowohl auf Java als auch auf der anderen Inselwelt deutlich vor Augen tritt. LAM (13) hat auf Seite 122 in der Figur 2 eine Skizze gegeben, in der er die Orte mit einer bestimmten Anzahl von Regentagen innerhalb der 4 trockensten Monate des Jahres einzeichnet. Dabei zeigt sich (vgl. *Karte 2*), dass die Linie, die Orte unter 20 Regentagen umschliesst, fast genau das Gebiet unter 250 Ozeanität umgreift. In Java gehört der ganze Norden und fast der ganze Osten etwa ab 110° Ost mit Ausnahme der höheren Teile, dann ganz Madoera, ferner die Kleinen Sunda-Inseln dazu; hier fällt auf Flores nach der Karte in LAM (13) die Südwestküste aus dieser Zone heraus, nach der Indexberechnung ergibt sich, dass die Orte, die hier Beobachtungsstationen aufweisen, Indices über 250 haben, jedoch 1200 m hoch mehr im Inneren der Insel liegen. Meines Erachtens hat jedoch die Küste weniger als 250 Ozeanität, die sich eben nur im Gebirge infolge der Steigungsregen hebt, weshalb ich nicht wie LAM eine Ausbuchtung der entsprechenden

Linie nach Norden, sondern ein inselhaftes Vorkommen auf der Karte einzeichnete. Das Gleiche habe ich auch für das Innere und den Südwesten der Insel Soemba angenommen, wo bei Niederschlägen zwischen 200—240 cm der Index über 250 steigen dürfte. Im Norden gehören die Südspitzen der beiden Halbinseln am Golf von Bone auf Celebes samt den vorgelagerten Inseln und inselhaft einige kleinere Flecken bei Watampone und am Golf von Mandar sowie der Ostteil von Boeroe zur Zone des Index unter 250, dann aber in Abweichung von der Kurve bei LAM (13) mit Indices knapp unter 250 die südöstliche Soela-Insel, ein breiter Streif nördlich und südlich am Golf von Tomini auf Nord-Celebes und von hier westwärts bis Ost-Borneo etwa zwischen Samarinda und Tandjoengredeb. Auch einzelne Punkte im Norden und Südosten von Halmahera sowie die Obi-Insel scheinen Indices unter 250 zu haben. Ebenso weist Neu-Guinea zwischen der Frederik-Hendrik-Insel und dem Golf von Papua diese Ozeanität auf.

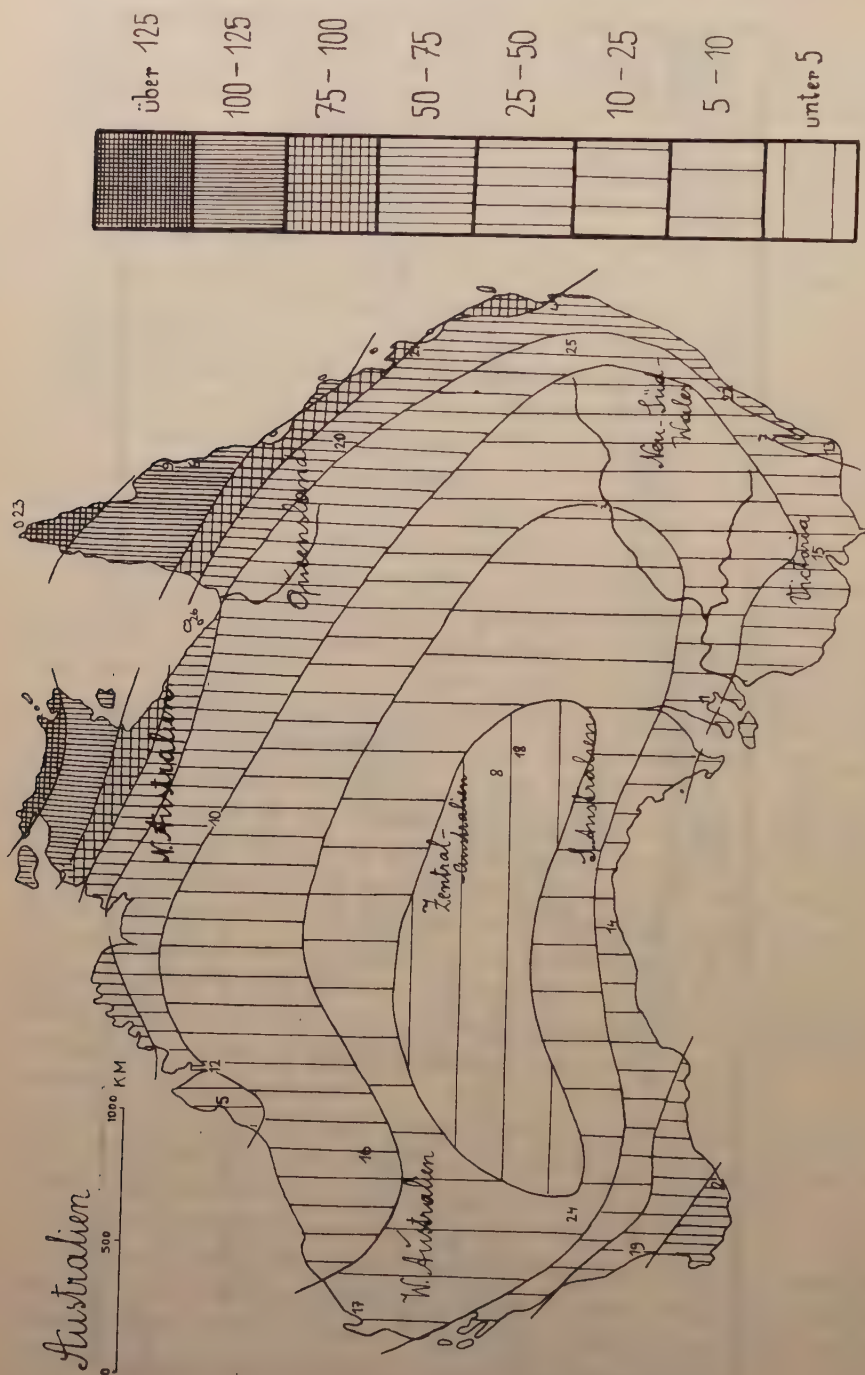
Die Insel *S u m a t r a* liegt mit wenigen noch zu besprechenden Ausnahmen durchaus unter einem Index von mehr als 300, der namentlich im Barisan-Gebirge und an der Südwestküste 500 und sogar 700 übersteigt. Die Nordostecke etwa ab Koetaradja bis nordwestlich von Medan liegt unter 250, hier überwiegt nach VAN STEENIS (18) Strauch- und Grasformation und lichter Savannenwald von xerophilem Habitus, stellenweise mit *Pinus Merkusii*, weiter gegen Süden steigt der Index gegen 500; nur im Gebiet des Toba-Sees (Provinz Tapanoei Nord) findet sich eine grössere kontinentale Insel auch aus den Berechnungen mit Indices nicht viel unter 250, weshalb auch hier wieder xeromorphe Formationen, vornehmlich Savannen anzutreffen sind, soweit nicht Kulturland die Flächen besetzt hat; kleinere Flecken mit Indices unter 250 scheinen auch bei Fort de Kock und Sawahloentoe (Sumatras Westküste) aufzutreten. Hingegen ist der Rest der Insel im wesentlichen von Regenwäldern bedeckt, soweit nicht, wie an der Küste, bodenbedingte Formationen vorherrschen, oder die Urlandschaft der Kultur, bzw. dem nachfolgenden Sekundärwald gewichen ist.

Billiton mit Ausnahme des Nordrandes und ebenso Bangka liegen zwischen 300—500, der Rest der beiden Inseln knapp über 500. Neben Regenwaldresten und kleineren Savannen auf Ost-Billiton herrscht heute hier der Sekundärwald (18).

Borneo weist im Inneren sowie an der Südwest- und Nordküste Ozeanität über 500, ja stellenweise, wie in Tarakan, sogar über 800 auf, an der Küste und im Südosten sinkt der Index unter 500, je etwa zwischen Samarinda und Tandjoengredeb, wie schon erwähnt, unter 250.



KARTE 2.
(für die Nummer s. S. 297).



KARTE 3.
(für die Nummer s. S. 298).

Das Innere nimmt in Höhen zwischen 1600—3000 m vielfach Nebelwald ein, darüber dehnt sich stellenweise, wie auf dem Kinabalu in Britisch-Nord-Borneo, alpine Vegetation aus; von der Küste steigt bis dahin meist tropischer Regenwald z. T. *Dipterocarpus*-Wald in verschiedener Abstufung hinan. Nur im Südosten gibt es auch Savannen und hauptsächlich an den Flüssen in West-Borneo (Pontianak) Sekundärwald und Kulturlandschaft.

Auf Celebes dürften die Indices mit Ausnahme des Südens und des Golfs von Tomini sowie einer Zone von hier an die Westküste, wo sie unter 250 bleiben, und auch der Umgebung des Golfs von Tolo, wo sie örtlich 500 übersteigen, zwischen 250 und 500 liegen. Der grösste Teil der Insel ist von Regenwald bestanden, im Gebirge, besonders im Südosten treten *Agathis*-Wälder stellenweise bis 2500 m auf, im Inneren gehört *Agathis* auch mit *Pandanus* der Nebelwaldzone an, die bei etwa 1400 m beginnt. Vor allem im Süden und auch um Donggala stellt sich in niederen Teilen Gras- und Buschformation neben Sekundärwald ein.

Agathis-Wälder finden sich auch neben anderen Regenwaldformen auf allen Inseln rings um die Ceram-See bei Indices über 250, auf Ost-Boeroe tritt auch *Melaleuca*-Wald formationsbildend auf und zwar wahrscheinlich nach Grasbränden in Savannenform ebenso wie auf Ceram, ferner auf Borneo und in Ost-Sumatra.

Neu Guinea gehört im Norden zur Zone über 500, im Osten sinkt der Index ebenso wie im Süden stark ab, wo in Merauke 250 wohl nicht mehr erreicht werden. Nach der Vegetationskarte in H. J. LAM (13) sind gerade hier im Süden an der Torres-Strasse anscheinend die grössten zusammenhängenden Savannengebiete der Insel, vielfach auch mit australischen Typen. Der Rest, abgesehen von edaphischen Formationen und der offenen Formation oberhalb der Waldgrenze im Zentral-Gebirge von Nord-Neu-Guinea, wird durchaus von Regenwald und Regenbergwald eingenommen.

Die Kontinentalitätszone mit einem Index unter 250, ja im Osten vielfach stellenweise unter 100 (vgl. Karte 2), erstreckt sich, wie wir schon vorhin gesehen haben (S. 283), von Ost-Java weiter über die Kleinen Sunda-Inseln und über Timor wohl bis an die Arafoera-See und nach dem Süden von Neu-Guinea. Daher nehmen den grössten Teil dieser Inseln Savannen sowie Strauch- und Grasformationen ein, soweit nicht Kulturf lächen die ursprüngliche Pflanzenwelt verdrängt haben. Auf allen Kleinen Sunda-Inseln tritt wieder *Casuarina*-Wald (*Casuarina Junghuhniana*) auf, der aber hier zum Beispiel auf Timor schon bei 300 m seine Grenze findet. Er reicht ostwärts über Flores, die Solor- und Alor-Inseln bis zu den

Südwest-Inseln. Auch Djati-Walder sind auf den Kleinen Sunda-Inseln verbreitet. Regenwälder finden sich über grosse Flächen eigentlich nur bis Soembawa in den höheren Teilen, die ja, wie wir auf Flores gesehen haben, höhere Indices aufweisen dürften. Dagegen treten ab Mittel-Flores gegen Osten bis Damar und Moa (Südwest-Inseln) *Eukalypten*-Wälder bestandbildend auf, unter die sich, wie auf Wetar, auch australische Akazien-Arten mengen. Nach den spärlichen Indexberechnungen und der Regenfallkarte dürfte an den in der Figur 4 bei VAN STEENIS (18) bezeichneten Stellen der Index zwischen 50 und 75 schwanken, ja auf der letztgenannten Insel vielleicht 50 nicht einmal erreichen. Nur auf Süd-Timor steigt die Zahl über 150. Auch in Australien dehnen sich die meisten Eukalypten-Wälder unter Indexzahlen von 50—70 im Südwesten und bei geringerer Ozeanität auch im Osten und Nordosten aus, wie noch dargelegt werden wird. Diese für die Tropen so kontinentale Zone, die ganz aus dem Rahmen der übrigen Insulinde herausfällt, schliesst südwärts über die Soemba-Insel einerseits an die 125 übersteigende, aber 200 nicht mehr erreichende Zone auf Arnhem-Land (Nord-Australien), anderseits an eine gleich ozeanische Zone auf der Halbinsel York an.

AUSTRALIEN (Karte 3) und NEU-SEELAND.

Die Thursday-Insel, die York vorgelagert ist, hat annähernd den gleichen Index wie Süd-Timor, auf Arnhem-Land dürfte er im Norden die gleiche Zahl erreichen, doch nimmt er südwärts gegen das Landinnere sehr rasch ab. Schon bei Pt. Darwin ist die Indexlinie 100 erreicht, die dann quer durch den Carpentaria-Golf an die australische Ostküste zieht, die sie erst südlich Kap Bowling Green (ca 20° S) verlässt. Diese Linie deckt sich teilweise mit der Niederschlagsmenge von 139 cm im Jahr nach den Karten des Bureau of Meteorology in Melbourne (9, 21). Bis hierher reicht auch das frostfreie Gebiet. Der Streifen von 75—100 Index ist sehr schmal: er reicht südwärts etwa bis zu einer Linie, die von 14° Süd auf Arnhem-Land über Boorooloolo, die Wellesley-Inseln, Rockhampton bis gegen Grafton südlich von Brisbane zieht. Nach den Vegetationskarten (6, 8, 18) dürfte es sich hier um *Pluvilignosa* (subtropischen Bergwald 15, Rain forest Northern 19) handeln, die am besten an der Ostküste von Queensland ausgebildet sind, wo sie in einem schmalen und oftmals unterbrochenen Streifen etwa ab 13° Süd bis südlich Brisbane, gegen Süden immer zerstreuter auftretend, ziehen, also soweit eben der Index 70 überschreitet (vgl. 14, S. 211, I A b). Die Hauptarten des Holzwuchses sind hier *Tarrietia*, *Flindersia*, *Dysoxylum*, *Cedrela*, *Elaeo-*

carpus, *Ficus*, *Araucaria* und auch *Agathis*. Hier in diesem zumindest subtropischen Gebiete werden auch Apfelsinen, Bananen, Ananas u. ä. gebaut, im Osten von Cairns in Queensland bis Grafton in Neu Süd-Wales auch Zuckerrohr bis zu Indices knapp über 70.

Auf Arnhem-Land und in Queensland samt der Halbinsel York mit Ausnahme der früher erwähnten Gebiete an der Küste treten neben verschiedenen Eukalypten *Erythrophloeum Labouchei* („Ironwood“) und *Melaleuca*, welche Gattung wir schon aus Insulinde kennen gelernt haben, am Goyder-Fluss neben anderen Palmen auch *Livistona Mariae* und weiter im Osten *Pandanus* und *Grevillea* auf. Interessant ist hier auch das Vorkommen einer Imperata-Art (*Imperata cylindrica*), wie sie auch für die Kontinentalzone im Malaiischen Archipel kennzeichnend ist (Tropical open Forest z. T., nach 19).

Landeinwärts geht sowohl auf Arnhem-Land, wo ganz allgemein die Durchdringung der feucht-tropischen Vegetation mit Savannen kennzeichnend ist, als auch auf der Halbinsel York und in Queensland der Regenwald rasch in tropische Baumsavannen mit vorwiegend Eukalyptusbäumen (Tropical Open Forest z. T., nach 19) bei Indices zwischen 70—130 über, die etwa an einer Zone von Wyndham (East Kimberley)—Arnhem-Land bei 14° Süd — südlich des Carpentaria-Golfes — Wurzel der Halbinsel York — Gebirgsschuss der Kordillere in lichte subtropische Eukalyptus-Savannen (Open Grassland Northern) übergehen, in denen Indices zwischen 40—75 vorherrschen. Auch hier dominieren in verstreuten Gruppen neben Eukalypten Akazien und im Westen auch *Hakea*. Dieses Gebiet wird also von der Ozeanitätslinie 50 durchschnitten, die ungefähr von der Kimberley-Küste in West-Australien über den Cambridge-Golf zum innersten Winkel des Carpentaria-Golfes, von hier an den Aussenrand der Kordillere zur Küstenkette etwa im Distrikt Kennedy Nord und entlang der Küste südwärts über Sydney und Eden hinaus verläuft. Diese Linie zeigt auch eine weitgehende Uebereinstimmung mit der Niederschlagslinie, die Orte von 75 cm Jahresniederschlag verbindet.

Landeinwärts von der lichten Eukalyptus-Savanne tritt schliesslich der Baumwuchs nur mehr als Galeriewald auf, die Savanne geht in echte Grassteppen über, die besonders im Kimberley-Distrikt und in den Beckenlandschaften im Osten (Artesisches Becken, am Murray und Darling) bei Indices zwischen 20—35 entwickelt sind, also bei gleichen Indices wie in den Galeriewaldsteppen der Vereinigten Staaten von Amerika.

An das Regenwaldgebiet im Osten des Kontinentes schliesst sich südlich von Brisbane am Aussenrand der Australischen Kordillere von

Neu Süd-Wales über Victoria und weiter bis in den Südost- und Südteil von Süd-Australien wieder ein geschlossenes Waldland an (Close Forest Southern nach 19), in dem verschiedene Eukalypten allenthalben vorherrschen. Im Norden tritt besonders *Araucaria Cunninghamii* im Gebirge dazu, in Victoria *Acacia melanoxylon* und *Fagus Cunninghamii*, deren Waldgebiete stellenweise wie am Mt. Hotham bei Melbourne bis in die Gipfelregion auf 1900 m emporklimmen. In den feuchteren Teilen des Gebirges, etwa wie in den Blauen Bergen, stellen sich bei einer Niederschlagsmenge von 127—140 cm, also bei einem vermutlichen Index um 100 stellenweise Farnwälder ein, ungefähr unter ähnlichen Verhältnissen, wie an der südhilenischen Küste, z. B. auf den Juan-Fernandez-Inseln. Auf den höchsten Bergen, wie am Mt. Kosciusko, tritt nach einer Art Kampfzone zwischen ca 1400—1800 m, die wieder von verschiedenen sehr zerstreut stehenden Eukalyptus-Arten gebildet wird, eine Art alpiner Steppe, bzw. Matte in ca 1800—1900 m Höhe auf, wo die Niederschlagsmenge 152 cm und damit allem Anschein nach auch der Index 150 übersteigt.

Im Südostteile von Süd-Australien finden sich ebenfalls noch kleinere Waldgebiete vorwiegend aus Eukalypten, denen sich aber auch *Casuarina stricta* und *Xanthorrhoea quadrangulata* („Grasbaum“) zugesellen; die Indices bewegen sich hier im allgemeinen zwischen 25—40. Diese Waldstreifen mischen sich stellenweise mit den ihnen meist landeinwärts vorgelagerten, eigentlich auf die weitere Umgebung von Adelaide beschränkten offenen Baumsteppe (Open Forest Southern, nach 19), in der der Baumwuchs wieder ausschliesslich von Eukalypten (*Eucalyptus cladocalyx* und *E. diversifolia*) repräsentiert wird. Die Indices liegen hier knapp über 25—30.

Auch im Südwesteck Australiens südlich Perth bis Albany dehnt sich ein Gebiet mit Indices über 50 aus. Landeinwärts von dieser Zone ist durch den ausgedehnten Weizenanbau die Urlandschaft von Eukalyptus- und Buschwald zum grössten Teil verändert worden, man hat auch noch in die Zone des Mallee-Scrub unter 25 Ozeanität den Ackerbau vorgetragen. Von den ursprünglichen Waldelementen ist in dieser extratropischen Savanne (Southern Open Forest nach 19) unter den anderen Eukalypten besonder die Jarra (*Eucalyptus marginata*) hervorzuheben.

Südwestlich von Albany tritt an deren Stelle bei Indices von 60—70 die Karri (*Eucalyptus diversicolor*) mit mehr als 100 m Höhe, der schönste Baum des Südwestens, der mit anderen Eukalypten, Akazien und *Casuarina glauca* den Hauptteil dieses schmalen Streifens dichten

Waldlandes bestreitet, das an Regenwälder gemahnt (Southern Rain forest nach 19); doch ist auch dieser Karri-Wald seiner Typenzusammensetzung am ehesten mit E. RÜBEL (15) als extratropische Savanne den *Duriherbosa* unterzuordnen.

Eukalypten treten auch in den Scrub ein und nehmen integrierenden Anteil an dessen Aufbau. Der Scrub ist der mediterranen Macchie verwandt. Er findet sich als Mallee-Scrub namentlich im Südwesten von Neu Süd-Wales, im Nordwesten von Victoria, im Südwesten von West-Australien und in Süd-Australien, seltener und mit dem Akazien-Scrub vermischt auch in Zentral-Australien vor allem südsüdwestlich von Daly Waters. Neben Eukalypten haben noch je nach Lage am Aufbau des Mallee-Scrubs Anteil: *Callitris*, *Dodonaea*, *Casuarina lepidophloea* und *C. glauca*, *Heterodendron oleifolium*, *Fusanus*-Arten, *Myoporum platycarpum*, *Eremophila*, *Grevillea*, *Hakea*, *Beyeria*, *Melaleuca*, *Leptospermum*, *Baeckea* u. a., stellenweise wie in West-Australien auch Akazien (19). Der Mallee-Scrub findet im Süden des Kontinents sehr scharf seine Kontinentalitätsgrenze bei einem Index von 10, welche Linie von der Westküste bei Carnarvon quer durch den ganzen Kontinent im Süden bis zur Riverina mit der Nordgrenze des Mallee-Scrubs parallel verläuft. Auch in Zentral-Australien reicht diese Scrubtype nicht über die Indexlinie 10 landeinwärts. Seine obere Ozeanitätsgrenze ist ebenfalls ziemlich scharf mit 25 ausgebildet, nur am Australischen Golf in West-Australien scheint der Index zwischen Albany und Eucla bis etwa 40 Ozeanität zu reichen.

An der Grenze von Zentral-Australien gegen Nord-Australien sowie am Innenrand der Kordilleren in Queensland und stellenweise in Neu Süd-Wales dehnt sich der Akazien-Scrub (Brigalow-Scrub) aus, dort mit Mallee-Scrub, hier mit Savanne und Grassteppe untermischt. In dieser Formation dominieren verschiedene Akazienarten, wie *Acacia harpophylla* mit bläulich-grauem Laub und unruhig verzweigtem knorrigem Stamm, ferner *Acacia Cambagei* u. a., denen sich einzelne Eukalyptus-Arten, auch Casuarinen (*Casuarina lepidophloea*), *Melaleuca* etz. zugesellen. Im Osten durchdringt diese Formation auch die noch zu besprechende *Spinifex*-Flur. Die Ozeanität des Brigalow-Scrub schwankt im Norden zwischen 10 und 25, im Osten anscheinend zwischen 10 und 50, wobei aus den Karten die genaue Verbreitung und damit auch die obere Grenze nicht genau festzustellen ist.

Die dritte Scrub-Type, der Mulga-Scrub, findet sich in breiter Zone etwa südwärts der Linie Onslow—Charlotte Waters—Charleville—Westrand der Kordillere sowie auf der Oberplatte Zentral-Australiens und

schliesst südwärts an den Mallee-Scrub oder die Salzbusch-Formation an (19). Im Westen ist er ziemlich rein ausgebildet, weiter östlich mischt er sich mit der *Spinifex*-Flur und der Salzbusch-Formation. Auch an seinem Aufbau sind verschiedene Akazien-Arten von 5—6 m Höhe in kleinen Gruppen beteiligt, unter die sich sehr vereinzelt vor allem an den Wasserläufen und in den Trockentälern Eukalypten neben *Callitris robusta* und *Casuarina lepidophloea* mengen. Im allgemeinen bleibt im Mulga-Scrub die Ozeanität unter 10, nur im Osten scheint sie namentlich in Queensland nördlich von Bourke auf 15—20 zu steigen; doch ist gerade diese Gegend arm an Stationen, die zur Berechnung herangezogen werden konnten. Die stärkere Kontinentalität, die klimatisch den Mulga-Scrub gegenüber dem Brigalow-Scrub, dem nördliche Akazien-Scrub, unterscheidet, äussert sich auch im Graswuchs, in dem *Spinifex* (*Triodia*), das xerophytischste Gras Australiens, vorherrscht. Im Osten von West-Australien und in Zentral-Australien sowie in kleineren Teilen in Südwest-Queensland tritt dieses Gras von Hartlaubtypus auch als eigene *Spinifex*-Formation bei Indices unter 15, ja meist unter 10 auf, im Inneren erreicht die Ozeanität sogar nicht einmal mehr 5. An Stelle des Scrub werden auch auf manchen Karten (6) Halbwüsten oder Wüsten angegeben, wo, wie besonders im Westen um den Wendekreis, der Index sogar unter 4 sinkt.

Namentlich am Australischen Golf, von diesem durch einen schmalen Streifen Mallee-Scrub getrennt, dehnt sich ferner bei Indices zwischen 10 und 20 die Salzbuschsteppe aus, in der *Atriplex*-Arten (*Atriplex vesicaria*, *A. stipitata*) und *Kochia* dominieren; auch verschiedene Hölzer sind beigemischt, die örtlich stark verschieden sind. Diese Formation tritt uns auch im Seengebiet des Staates Süd-Australien und am Darling bei Indices zwischen 5 und 15 entgegen.

Tasmanien schliesst sich ziemlich eng an das Festland an; sein Osten und Norden liegt unter 50 Ozeanität und hat vor allem dichten Eukalyptenwald als ursprüngliche Vegetation. Auch Akazienarten nehmen an seinem Aufbau Anteil wie *Acacia melanoxylon* und *A. dealbata*. Der Westen weist je nach Höhenlage Indices von 70—100 auf und ist auch heute noch ein dichtes Waldland mit *Nothofagus Cunninghamii*, *Dacrydium Franklinii*, *Arthrotaxis*, *Phyllocladus rhomboidalis*, *Atherosperma moschatum* u. a. sowie Baumfarnen wie *Dicksonia* (19). Im Inneren auf der Hochfläche, die ab 1200—1300 m waldlos ist und Jahresmittel unter 12° sowie nach der Regenkarte Ozeanitätsindices über 100 aufweist, finden sich sogar *Sphagniherbosa*, sowie Heideelemente (*Leptospermum*).

Der Vollständigkeit halber sei hier auch noch Neu-Seeland an-

geschlossen. Dieses zeigt namentlich auf der Südinsel eine reiche Gliederung des Index von West nach Ost. Während die Westküste Indices über 200 aufweist und auch das Innere noch verhältnismässig ozeanisch ist, ist der Osten bedeutend kontinentaler, im allgemeinen zwischen 50 und 100, ja stellenweise, wie in der Canterbury-Ebene bei Christchurch, werden nicht einmal mehr 50 Ozeanität erreicht. Der Westen der Insel trägt daher Farnwälder und Nebelwälder ähnlich den Valdivia-Wäldern Süd-Amerikas, die in Süd-Chile ebenfalls bei Indices über 150 bzw. 200 bis auf 2.000 m von der pazifischen Küste emporsteigen und an den Regenwald der Tropen gemahnen; RÜBEL (15) stellt sie als ozeanische Regenwälder zu den Laurilignosen. Darüber folgen auf Neuseeland Regengebüsche mit vielen Dornsträuchern. Die höchsten Teile, über die mir mangels an Stationen keine Indexberechnungen möglich waren, besiedelt alpine Flora. Im trockenen Osten treten steppenähnliche Formationen auf, die vielfach an den australischen Scrub gemahnen. Die Nordinsel ist ziemlich gleichmässig ozeanisch, ihre Indices liegen knapp um 100, jedoch ist auch hier der Osten deutlich kontinentaler, am stärksten wohl um die Hawkes-Bay, wo Napier kaum mehr 70 Ozeanität erreichen dürfte. Die Höhen sind daher waldbedeckt, insofern sie nicht über die Waldgrenze hinausreichen; besonders üppig ist das Waldland im Südwesten und auf der Auckland-Halbinsel, wo es subtropischen Einschlag zeigt; hier kommt etwa bis zur Linie Kawhia Harbour im Westen und Bay of Plenty im Osten in prachtvollen Exemplaren die Kauri-Fichte (*Agathis australis*) vor, deren Grenze etwa mit der Indexlinie 100 zusammenfällt; ihre nahe Verwandte, die Damar-Fichte (*Agathis Dammara*) ist ein Bewohner der Malaiischen Inselwelt. Sowohl auf der Nord-Insel als auch auf der Süd-Insel an der Cook-Strasse tritt stellenweise bei Indices um 100 die Myrtaceen-Heide (*Leptospermum scoparium*) auf.

KULTURPFLANZEN.

Zum Abschluss dieser Skizze sei es mir gestattet, einige Worte über die Verbreitung einiger Kulturpflanzen und ihre Ansprüche an die Ozeanität der Klimas zu sprechen. Von den extratropischen Kulturpflanzen möchte ich hier nur auf den Weizen, das Hauptgetreide Australiens, eingehen, da ja auch dieser Kontinent z. B. 1934 mehr als 3 % der gesamten Welternte an Weizen geliefert hat und mit Recht als Kornkammer bezeichnet wird. In den Hauptanbaugebieten, die in nachfolgender Tabelle mit den Indices zusammengefasst sind, liegt die

Hauptanbaugebiete des Weizens in Australien samt ihrer Ozeanität.

Das ehemalige Buschland in West-Australien ...	20—45
Süd-Australien im Gebiet der Grossen Buchten und der Halbinseln York und Eyre	20—40
Westliches Längstal in Victoria	ca 40
Gippsland östlich von Melbourne	ca 40
Downs zwischen Riverina und Kordilleren	15—35
Wimmera mit den höheren Teilen der Flussebenen (Riverina)	20—25

Ozeanität durchaus zwischen 15 und 45, wobei an der unteren Grenze auch das Trockenfarm-System angewendet wird. Diese Werte stimmen recht gut mit der Ozeanität der allgemeinen Weizenzone auf der ganzen Welt überein, die 50 Ozeanität nur selten übersteigt, worauf ich noch an gesonderter Stelle zurückkommen werde.

Der Weinbau beschränkt sich im allgemeinen auf die kontinentalen Gebiete am Murray mit Indices zwischen 15 und 20 und an den Downs mit Indices zwischen 20 und 35.

Von den tropischen Kulturpflanzen will ich hier nur auf jene eingehen, die sowohl im besprochenen Gebiet als auch in der Weltwirtschaft grössere Bedeutung haben, da die allgemeine Besprechung einer anderen Arbeit vorbehalten ist. Auch können bodengebundene Pflanzen, wie z. B. der Reis, nicht berücksichtigt werden.

Das Zuckerrohr wird hauptsächlich in Mittel- und Ost-Java bis 1000 m gebaut, wo ja auch *Saccharum spontaneum* verbreitet ist. Seine Heimat ist in einer Zone in Süd-Asien zwischen 22—28° Nord und 82—90° Ost am unteren Ganges und Brahmaputra zu suchen (17). Nach meinen Berechnungen (14) bewegt sich dort der Index meist zwischen 70 und 250. Im Zuckeranbaugebiet auf Java erreicht der Index ausser in Banjoemas nirgends Indexzahlen über 300, meist sogar nicht mehr 250. Damit stimmt auch die Angabe (18) überein, dass sein Anbau besonders im Gebiet bis 20 Regentagen in den 4 trockensten Monaten betrieben wird. Zuckerrohr wird auch in Australien in Queensland von Cairns bis Grafton in Neu Süd-Wales gebaut, soweit also die Indices wieder 70 nicht unterschreiten. Allerdings liegt das südliche Anbaugebiet bereits ausserhalb der frostfreien Zone, weshalb hier die Ernte nicht mehr sicher ist, da das Zuckerrohr gegen Frost äusserst empfindlich ist, während ihm Hitze bei genügend hoher Feuchtigkeit nichts anhaben kann.

Kaffee wird besonders auf Java in den Provinzen Bantam, Preanger, Semarang, Madioen und Pasoeroean, an der Westküste Sumatras (Palembang, Benkoelen, Tapanoeli, Atjeh), auf Celebes und Menado sowie Bali und Lombok bis 1000 m gepflanzt (7). In Java liegen diese Gebiete durchaus in Ozeanitätszonen zwischen 300—500, im Westen auch etwas darüber und im Osten darunter. In Sumatra unterschreiten die Indices 130 nicht, auf Celebes und Menado bewegen sie sich knapp über 200, auf Bali und Lombok zwischen 200—250. Nach SPRECHER (17) benötigt *Coffea arabica* eine mittlere Jahrestemperatur von 18—22° und maximal 150 cm Niederschlag, die anderen Kaffeesorten, vor allem *Coffea liberica* 20—25° und maximal 300 cm Niederschlag. Die Indices in der Heimat von *Coffea arabica*, also in Abessinien, sinken nicht unter 90, die der *Coffea liberica* bewegen sich zwischen 200—350; dem Maximum von 300 cm Niederschlag entspricht ein Index von 500 im tropischen Gebiet, dem Maximum von 150 cm etwa ein Index von 110.

In Insulinde wird heute fast ausschliesslich mehr Assam-Tee gebaut. In dessen Heimat sinkt der Index nicht unter 120—190, in Insulinde, wo Tee auf Java vor allem in den Landschaften Garoet, Cheribon, Buitenzorg und Krawang mit dem Zentrum in der Landschaft Preanger (7) (Soekaboemische Landbau-Vereinigung), in Mittel-Java in Pekalongan, Kedoe und Semarang und in Ost-Java am Keloet und Smeroe und in Pasoeroean, ferner an Sumatras Ostküste und an anderen Stellen gebaut wird, bleibt der Index minimal zwischen 125 und 300, während seine obere Grenze weit über 300 steigt. Nach VAN STEENIS (18) und SPRECHER (17) liegt das beste Teekulturgebiet bei 15—22° Jahresmittel in Höhen von 200—2000 m bei mindest 30 Regentagen in den 4 trockensten Monaten und ca 160—240 cm Jahresniederschlag bei hoher Luftfeuchtigkeit; es entsprechen diese Zahlen im Mittel durchaus einem Index von ungefähr 250.

Kakao wird heute besonders in Nord-Celebes, im mittleren und nördlichen Teil von Neu-Guinea, auf Java (Semarang, Pekalongan, Soerakarta, Merapi, Smeroe, Malang, Janggebiet in Besoei) und an anderen Stellen gezogen. Er verlangt nach SPRECHER (17) ein gleichmässiges Klima von 24—28° Jahresmittel ohne grosse Schwankungen, jedoch mit hoher Luftfeuchtigkeit und mindest 200 cm Niederschlag. Seine Heimat, das Cauca- und Orinoko-Gebiet in Kolumbien bzw. Venezuela sowie das Amazonas-Land weist, soweit dies zu ermitteln war, durchaus Indices zwischen 170—380 auf. In Insulinde zeigt der Index eine untere Grenze von ca 200, gegen oben scheint er wohl 400 noch zu überschreiten.

Kautschukplantagen (*Hevea brasiliensis*) finden sich auf Java

(Batavia, Buitenzorg, Salatiga, Malang usw.) sowie auf Ost-Sumatra und Borneo (7) bei Indices zwischen 300—500. In Brasilien liegt das Heimatgebiet der *Hevea* in einer Ozeanitätszone zwischen 250—400.

Der Chinarindenbaum wird heute nach VAN GORKOM (7) stellenweise auf Java und Sumatra gepflanzt, die Indices bewegen sich hier zumindest zwischen 300 (Tjibeureum) bis über 500 (Rioeng-Goenoeng, Kawah Tjiwidei). Im Heimatgebiet am Osthang der südamerikanischen Anden liegen nach der Ozeanitätskarte und nach der Regenmenge die Indices zwischen 275 und ca 500.

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Erklärung der Bezifferung der einzelnen Karten.

Karte 1 (Java).

Ardjoeno	1	Pekalongan	31
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Bangelan	42	Sindoro	37
Banjoewangi	7	Soekaboemi	38
Baroe-Fluss	8	Soemboeng	39
Batavia	9	Soerabaja	40
Bengawan-Fluss	10	Tengger-Gebirge	41
Blambangan-Halbinsel	11	Tjilatjap	47
Bondojoedo-Fluss	12	Tjitandoej	48
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(Djeng-)Dieng-Plateau	16		
Galoenggoeng	17		
Gradjagan-Bucht	18		
Halimoen-Gebirge	19		
Idjen-Gebirge	20		
Karanganjar	21		
Kawah Tjiwidei	22		
Kediri	24		
Keloet-Gebirge	23		
Lawoe	25		
Magelang	26		
Merbaboe	27		
Merapi	28		
Ngandjoek	43		
Panandjoeng-Bucht	29		
Pangerango	30		

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Alor-Inseln	1
Arafoera-See	2
Bangka	3
Billiton	4
Boeroc	5
Bone-Golf	6
Ceram-Insel	7
Ceram-See	8
Damar-Insel	9
Donggala	10
Flores	11
Ft. de Kock	12
Frederik-Hendrik-Insel	13
Halmahera	14
Koetaradja	15

Mandar-Golf	16
Medan	17
Merauke	18
Moa	19
Natoena-Insel	20
Obi-Insel	21
Padang	22
Pontianak	23
Samarinda	24
Soela-Inseln	25
Soemba-Insel	26
Soembawa-Insel	27
Solor-Insel	28
Südwest-Inseln	29
Tandjoengredeb	30
Tarakan	31
Timor	32
Toba-See	33
Tolo-Golf	34
Tomini-Golf	35
Watampone	36
Wetar-Insel	37

Karte 3 (Australien).

Adelaide	1
Albany	2

Boorooloola	26
Bourke	3
Brisbane	4
Broome	5
Cairns	6
Cambridge-Golf	27
Canberra	7
Charlotte Waters	8
Cooktown	9
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Melbourne	15
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A STUDY IN THE GENUS VULPIA

by

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(Issued April 20th. 1937).

In recent times, agrostologists have gradually found that the old system of the family of the grasses can no longer be accepted as a natural one and many changements are proposed by various authors. Not being satisfied with the thirteen tribes, accepted by BENTHAM and HOOKER and by HACKEL, many authors preferred to give a new arrangement because it is unpractical to divide so large a family in but thirteen tribes; consequently they introduced a greater number of tribes or groups. Especially the tribe of the *Chlorideae* is a very unnatural one, as there are brought together a great many very different and certainly not allied genera. The tribe of the *Festuceae* is another example of such a *mixtum compositum* and the subdivisions accepted in this tribe are once more very unnatural. Especially the reduction of the uppermost florets in the spikelet is not such an important character, as it is running through the whole family of the grasses. In applying this character such genera as *Melica* and *Glyceria* are widely separated, although they are in my opinion closely allied. ASCHERSON and GRAEBNER indicated already in their well-known Synopsis that it is striking that the genus *Glyceria* agrees with *Melica* as to the closed sheaths and the form of the stigmas. I found the hyaline margins and the summit of the lemmas always much agreeing in both genera. I saw recently to my surprise that this old idea was strongly propagated by the russian botanist NEVSKY, who placed *Glyceria* and a few other genera in the separate tribe of the *Meliceae*. This author proposed a quite different arrangement of other groups of the *Festuceae* and his expositions are in my opinion an important move in the right direction. His tribe of the *Bromeae* with a new classification of the genera is at the moment more natural, as the old genus *Bromus* is

purified by elimination of aberrant genera, although the author proposes perhaps far too much genera. I will deal with this question in a separate paper on *Bromus* before long. Since very large genera as *Andropogon* and *Panicum* are gradually divided into more natural ones by excluding very different groups, it is quite rational to give also a new grouping of the plants belonging to the genus *Festuca* as it was accepted by HOOKER, BENTHAM and HACKEL. On studying the genus *Festuca* as treated by ASCHERSON and GRAEBNER in their Synopsis, we find that *Festuca* is a mixtum of very different genera; these genera are so different, that it is impossible to place all of them, even as sections of the large genus *Festuca* in a natural system.

It is therefore necessary to limit the genus *Festuca* and to accept for this genus the treatment as it is given in HACKEL's admirable monograph of the genus *Festuca*. We all agree that the section *Atropis* in ASCHERSON's Synopsis represents a very good and distinct genus, but at the same time we must go on and accept definitively such genera as *Nardurus* REICHB., *Catapodium* LINK, *Scleropoa* GRISEB., *Desmazeria* DUMORT., *Cutandia* WILLK., *Sphenopus* TRIN. and *Vulpia* GMELIN. Although I am convinced that these genera and some other ones, not mentioned here, are very natural, it is not yet possible to give a sharp definition of them, because it is very probable that some species now accepted as a member of one of those genera, may belong to one of the others, as there are some species which are at the moment not yet fully known in all their characters. In HACKEL's monograph, cited above, many of the genera enumerated by me, were excluded by him and in modern time, the late SAINT YVES who treated the genus *Festuca* so extensively, accepted *Festuca* quite in the same sense of HACKEL's monograph. The genus *Atropis* (*Puccinellia*) is now universally recognized as distinct and taken up already in HACKEL's treatment in ENGLER and PRANTL's Pflanzenreich, but the genus *Festuca* was accepted there with *Vulpia* and *Nardurus* as subgenera. The true genus *Festuca* comprises no annual plants; with some rare exceptions in *Vulpia*, all the other genera mentioned above contain but annual species.

A much advanced treatment of the *Festuceae* was already given by BATTANDIER and TRABUT in their „Flore de l'Algérie”, Monocotyledones (1895) p. 120—122. In that work the following genera are recognized: *Sphenopus*, *Vulpia*, *Ctenopsis*, *Desmazeria*, *Catapodium*, *Nardurus*, *Scleropoa*, *Cutandia* and *Vulpiella*. *Festuca* is accepted in the sense of HACKEL. *Catapodium* is a mixture of *Eucatapodium*, *Castellia* and *Agropyropsis*. The latter was recently published as a new genus by

Miss CAMUS and placed in the *Hordeae*. *Nardurus* contains the *Vulpia cynosuroides* PARL., which is better to retain in the genus *Vulpia* and *Cutandia* of BATTANDIER and TRABUT is a mixtum of the true *Cutandias* and the *Vulpia incrassata* SALZM., for which is proposed a new subgenus *Vulpiella*. The species is, however, better retained in the genus *Vulpia*. In their „Flore analytique et synoptique de l'Algérie et de la Tunisie”, the authors BATTANDIER and TRABUT gave in the year 1902 the same arrangement.

It is not my intention to give here the grouping of the different genera of the tribe of the *Festuceae*, subtribe *Festucineae* ASCHERS. et GRAEBN. (Synopsis II p. 437), as I wish to treat in this paper the genus *Vulpia* more extensively.

GMELIN established the genus *Vulpia* in the year 1805 and based it on the *Festuca Myurus* of LINNÉ as described in the first edition of the Species Plantarum in 1753. This species is well-known to all agrostologists of Central Europe and represented by the type in the herbarium of LINNÉ. All the botanists who have seen it, especially MUNRO and PARLATORE, agree as to the identity with the plant commonly so called. That LINNÉ himself, in the second edition of the Species Plantarum, gave some different characters, which were taken from another South European species, received from LOEFFLING, a species with hairy lemmas, is no reason to give to the species, first described by LINNÉ, the name of *Festuca pseudo-myurus* as did SOYER-WILLEMET, who accepted the species with hairy lemmas as the true *Festuca Myurus*. This question is clearly explained by DUVAL-JOUE and by ASCHERSON. Although DUVAL-JOUE was a very accurate observer and very familiar with the *Vulpias*, studied so intensively by him, his conclusions are in some cases wrong, as the complete literature was probably not at his disposal or some publications were overlooked by him. His observations of the plants are, however, of great importance and his conclusions are, as I will show, easy to correct.

GMELIN's genus *Vulpia* was published in his Flora Badensis (1805). We find there on p. 1 under the CLASSIS MONANDRIA, DIGYNIA, *Gramineae* sub V. VULPIA: *Cal.* Gluma 5-flora. *Cor.* Gluma 2-valvis. On p. 8 of his work, the genus was described as a new one with the following description: „*Calyx* Gluma subquinqueflora, bivalvis, inaequalis: exterior minima lanceolata: interior major lineari-lanceolata, mucrone membranaceo terminata. *Corolla* Gluma bivalvis inaequalis, diaphana: *Valvula* exterior major, apice longe aristata. *Stamen* unicum. *Styli* duo. *Semen* tenue teretiusculum utrinque acutum, longitudinaliter sulco exaratum,

corolla tectum." This description of the genus is followed by a diagnosis, reading: „7 *VULPIA Myurus* panicula spicata, subsecunda, flosculis longe aristatis, scabris," and the different references to LINNÉ, POLLICH, HALLER, HUDSON and SCHEUCHZER. *Icon. Leers fl. Herbom.* t. 3 f. 5. p. 34. GMELIN gives further an important observation: „a Festucae genere maxime recedunt Festuca Myurus, F. pilosa et F. sciuroides ob calycis et corollae structuram et Stamen semper unicum. Stamen semper unicum in F. pilosa et Sciuroide in Castilia copiose obvenerunt vidi; in F. Myuro et Sciuroide idem observavit Ill. Roth. Fl. Germ. 2. p. 128—130."

Although GMELIN mentioned two other plants as belonging to this genus, he did not describe them. His *Festuca pilosa* which is the *Festuca ciliata* of DANTHOINE, is a nomen nudum, which is regrettable, since DANTHOINE's name is not valid and ASCHERSON's new name *Festuca Danthonii* disputable on account of the intrincating synonymy. GMELIN correctly understood the *Festuca sciuroides*, described by ROTH in the year 1789, but he did not make the combination *Vulpia sciuroides* GMELIN in the year 1805 as is given in ASCHERSON's Synopsis. We find this new combination much later in GMELIN's Supplement to his Flora Badensis (1826) p. 66. In KUNTH's Enumeratio Plantarum (Agrostographia Synoptica sive Enumeratio Graminearum) Vol. I. (1833) p. 396—397, the references to GMELIN are wrongly given as to the page 215 of GMELIN's work and in NEES's Agrostographia Capensis (1841) p. 440 under *Vulpia*, the citation pag. 215 is copied from KUNTH's work without verifying GMELIN's work, where on p. 215 *Festuca bromoides* is treated and not *Vulpia bromoides* as KUNTH and NEES indicate. *Vulpia Myurus* is easy to recognize when found growing in the fields of Central Europe; the difficulties to distinguish this species arise when we study the whole area of its dispersion. We now come to another *Vulpia*, described by LINNÉ as *Festuca bromoides* in the first edition of his Species Plantarum (1753) p. 75 under number 7. In the literature after LINNÉ we find many different opinions as to what species was so named by him. We know that MUNRO, in a paper on the identification of the Grasses of Linnaeus's Herbarium, published in the Journal of the proceedings of the Linnean Society of London in the year 1862, Vol. VI. p. 45, said under number 7, that the specimen in the herbarium was in his opinion, the same as number 5, the latter being *Festuca Myurus*. PARLATORE had already given the same opinion that *Festuca bromoides* was simply a synonym to *Festuca Myurus* L.. The species in question was thus, according to those authors, described twice by LINNÉ. When

ASCHERSON and GRAEBNER in their well-known Synopsis treated the genus *Vulpia* as published by GMELIN, accepting this genus as a section of the genus *Festuca*, they named the plant *Festuca dertonensis* and based this name on the *Bromus dertonensis* ALLIONI (Flora Pedemontana II. (1785) p. 249) noting, that *Festuca bromoides* belonged partly to this species, although they indicated at the same time: „L. in Herb.” Now this *Festuca dertonensis* is much allied to *Festuca Myurus* L. but generally to distinguish at first sight by the habit, being a strictly erect plant with a stiff panicle, with erect, not drooping branches. Those botanists who could study both species in the field will agree with me that they cannot be confounded. Thus it is a fact that ASCHERSON and GRAEBNER accept the species *Festuca bromoides* of LINNÉ as a mixtum because they place it under the synonyms of *Festuca dertonensis* with the addition: „L. pro parte.”

We should like to know what are the reasons why they excluded the name of LINNÉ and therefore we go to the authentic description, which prevails, according to our rules of nomenclature. This description consists of a short diagnosis followed by some references to the pre-linnean literature. LINNÉ cited Royen lugdb. 68. Raj. Pluk. and Scheuchz., Anglia and Gallia are given as the habitat. The diagnosis: „panicula secunda, spiculis erectis: calycis altera valvula integra: altera acuminata”, perfectly applies to *Festuca dertonensis*, which is the same as *Festuca sciuroides* ROTH. It was this species of ROTH that was transferred to *Vulpia* as *Vulpia sciuroides* by GMELIN in his Supplement (1826), overlooking the earlier *Bromus dertonensis* of ALLIONI from the year 1785.

Now it is very curious, that GMELIN treated the *Festuca bromoides* of LINNÉ, on p. 215 of his Flora Badensis, as a true *Festuca*, indicating it as an annual plant, allied to *Vulpia Myurus* or *Festuca Myurus* L. and giving the differences rather extensively, noting however that *Festuca bromoides* has 3 anthers, which cannot be true because *Festuca bromoides* L. has always but one stamen. From GMELIN's exact locality there is no other annual *Festuca* known and it is in my opinion certain that *Festuca bromoides*, as described by GMELIN, is quite the same plant as ROTH's *Festuca sciuroides* or ALLIONI's *Bromus dertonensis*. Important is GMELIN's observation under *Festuca bromoides*: „Ill. Linnaeus l. c. optime post F. myuros posuit, nostrates bene multi minus recte ante F. ovina, cum qua certe nullam habet similitudinem.” Of course the *Festuca ovina* L., which is moreover a perennial species, widely differs in its very different leaves and in the characters of the spikelets. The observation proves once more that GMELIN had the annual *Festuca*

dertonensis before him, notwithstanding his wrong indication of the 3 stamens.

In GMELIN's Supplement to his Flora Badensis (1826) he gives on p. 65 additional notes to his *Festuca bromoides*, indicating a variety β . „Culmis longioribus tenerioribus, flosculis saepissime monandris. Haec varietas mere differt a Festuca bromoide nostra seu Linnaeana: *Culmis* longioribus gracilioribus. *Flosculis* saepissime monamdris, nec triandris.” GMELIN thus found, that his *Festuca bromoides*, not treated by him as a member of his genus *Vulpia*, could have but one stamen, but in saying „saepissime”, he is still convinced that the species occurs with 3 stamens too. This follows from a further note by him, reading: „Individua numerosa, circa Carlsruhe examinata, persaepe flosculis triandris, praedita sunt. Individuum a Cl. Vahl in Fl. Danica et a Cl. Sowerby in Engl. Botany flosculis triandris depictum est.” If indeed there are among his numerous specimens from Karlsruhe, plants with three stamens, it is certain that these belonged to a true *Festuca* and not to *Festuca bromoides*. That the cited plates, show flowers which are triandrous, is not so strange; artists who prepared such drawings have often taken all sorts of liberties. At the end of the treatment of *Festuca bromoides*, GMELIN mentions his spanish plant, „*Vulpia sciuroides* mea, in Castilia lecta, semper monandra, longe differt a Festuca bromoide var. seu *F. sciuroide* Wibellii, Rothii et Willdenovii”.

It may be that GMELIN had the true *Vulpia bromoides* (*sciuroides*) from Spain. This species is not so very common there, I saw it from Castilia nova, in pratis ad Guadarrama, collected by LANGE. This locality is mentioned by WILLKOMM and LANGE in their Prodrum Flora Hispanicae, Vol. I (1870) p. 91. Many other localities under *Vulpia sciuroides* are doubtfully cited and the different species *Vulpia Broteri* BOISS. et REUT. is taken up there as a variety *longearistata* Wk.. It is also possible that GMELIN had from Spain the glabrous state of *Festuca ciliata* DANTHOINE, a species much more common there. This glabrous variety of *Festuca ciliata* DANTH. is not so easy to recognize from small forms of *Festuca bromoides* and its relation to *Festuca ciliata* was at the time of GMELIN not yet recognized. I have given here a rather long explanation to demonstrate how intricate the different ideas of a rather common plant were, during a long time, after being described by LINNÉ. Wrong observations by some authors were often accepted and have found their way through the literature up to the present.

DUVAL-JOUE, who studied the *Vulpias* very extensively, wrote a

very interesting paper: Sur les *Vulpia* de France, published in *Revue des sciences naturelles*, in the year 1880. In this paper the name *Vulpia sciuroides* (ROTH) GMELIN is accepted although DUVAL-JOUE was acquainted with the fact that the species was earlier described as *Bromus dertonensis* ALLIONI (DUV.-JOUVE, loc. cit. p. 48). This author says further on p. 31: „quand LINNÉ, dans la première édition du *Species*, établit son *F. bromoides*, il lui attribua aussi deux glumes (calycis valvula integra, altera *acuminata*, p. 75), ce qui convenait très-bien au *V. sciuroides* des modernes. Mais au même lieu, il référerait sa plante au *Gramen paniculatum bromoides, minus, paniculis aristatis unam partem spectantibus* de Raius et de Scheuchzer, pag. 297, tab. VI, fig. 14, qui est sans conteste le *V. uniglumis* des modernes et s'éloigne du *F. sciuroides* Roth, en ce qu'il a une de ses glumes *rudimentaire*, — minima vixque observabili —, et l'autre longuement subulée, — altera apice suo in aristam desinente —, Scheuchz., pag. 297.” DUVAL-JOUE now exclaims that there is a contradiction between the diagnosis of LINNÉ and the reference.

Although LINNÉ himself changed in the second edition of the *Species Plantarum* the word „*acuminata*” into „*aristata*”, the first description given by him is the valid one and agrees with the *Festuca dertonensis*. Even HACKEL and BRIQUET in their *Revision des Graminées de l'herbier d'Albr. de Haller filius*, published in the year 1906 in *Annuaire du Conservatoire et du Jardin botaniques de Genève*, say under *Festuca dertonensis* (loc. cit. p. 83): „Il vaut mieux, à la suite d'Ascherson et Graebner, abandonner le nom linnéen *Festuca bromoides* (1753) qui paraît s'appliquer à des plantes différentes et restera toujours inextricable.”

Unless we proceed in the study of this question, we cannot come to a decision. Because LINNÉ mentioned under the references at first VAN ROYEN's *Flora Leidensis*, we have to look what ADRIAAN VAN ROYEN has said there on pag. 68 of his *Festuca* no. 5. I think that few botanists and certainly not DUVAL-JOUE, have verified this citation of LINNÉ. For it is extremely astonishing to see, in VAN ROYEN's *Flora* on pag. 68, that LINNÉ copied the description, given by VAN ROYEN in the year 1740, verbatim, using exactly the same diagnosis of VAN ROYEN and copying the phrase name too, citing quite as VAN ROYEN did: Raj. hist. 1287. Syn. 415. Pluk. alm. 174. t. 33. f. 10. Scheuchz. hist. 297. Fortunately ROYEN's herbarium contains the sheet, upon which are written by himself in his fine handwriting, exactly the same data as published by him in the year 1740. The annual plants on the sheet are rather small specimens but they belong undoubtedly to the *Festuca sciuroides* of ROTH.

I have seen an authentic specimen of ROTH's species, given by ROTH to PERSOON, in the herbarium of the latter. On VAN ROYEN's authentic sheet we find after the diagnosis Roy. prodr. 68, inter parenthesis the word „*bromoides*” in another handwriting and written with a different kind of ink. This was done afterwards by his son DAVID VAN ROYEN.

It was a mistake of VAN ROYEN to place a wrong reference under his *Festuca* no. 5 and LINNÉ copied it without control, as is the case with so many references in LINNÉ's works. He quoted also often wrong plates and wrong citations of old authors and I will give here an example, which was interesting in the course of my investigations for a monograph of the genus *Digitaria*.

LINNÉ cites often phrase names of the work of SLOANE, as he did under *Panicum sanguinale* (spec. plant. p. 57). Now one of the specimens of SLOANE is the well-known *Leptochloa virgata*, so totally different from the crab-grass, as is the name of *Panicum sanguinale*, used by GRONOVIVS. The plate t. 70. f. 2 in SLOANE's work represents this *Leptochloa virgata* too. Now this wrong citation is given once more by LINNÉ in the second edition of the Species Plantarum in the year 1762, but in the same work it is also given under *Cynosurus virgatus* (p. 106), which is *Leptochloa virgata* (L.) P. B. This is correct but LINNÉ probably forgot to remove the wrong synonym under *Panicum sanguinale*. There is no reason to reject the well-known name *Panicum sanguinale*, because this name is based upon LINNÉ's own description and his specimen. In such cases we consider the wrong citations as misinterpretations of the old literature, which are of no influence to the nomenclature of the species.

VAN ROYEN, applying the phrase name „*Gramen paniculatum bromoides, minus*”, was certainly struck by the very small specimens he had at hand, the eight plants are indeed scarcely 10 cm high and the panicles have but 2—4 spikelets. In ROYEN's herbarium there is a second sheet with a small label only, reading in VAN ROYEN's hand „5 Festucae variet.” and once more in a darker ink in his son's hand the word „*bromoides*”. The three specimens are about 25 cm long, the exserted panicles are 5 cm long and all the plants belong to the same species, the *Festuca dertonensis*. They represent the better developed plants.

Now that we know the reasons why there is no accordance between the description of LINNÉ and the references, there are in my opinion no objections to accept for our *Festuca dertonensis* (*sciuiroides*) the first epithet *bromoides*, because *Festuca bromoides* L. is cleared up and identified. Belonging to the genus *Vulpia* as accepted in modern time, the species has to bear the name of *Vulpia bromoides* (L.) GRAY in „Natural

Arrangement of British Plants" (1821) p. 124. The same combination was published by DUMORTIER two years later in an often neglected little book „Observations sur les Graminées de la Flore Belgique" by B. C. Dumortier, Tournay (1823) p. 101. DUMORTIER maintains also *Vulpia sciuroides* as a variety, indicating it as *v. sciuroides* DUM. with the characters: Paniculâ basi ramosâ, locustis numerosis. He cites *Festuca sciuroides* ROTH, characteres precedentis, habitus sequentis (that is *V. Myurus* GMEL.), pedunculi adpressi. Field study proves that such more robust forms with branched panicles and more numerous spikelets occur together with depauperate lower plants with few spikelets in each panicle, so that the variety is not to maintain. I have cultivated *Festuca dertonensis* often in my garden and noted that it is easy to find in the cultures small specimens with reduced panicles and luxuriant ones with longer panicles and numerous spikelets. LANGE's variety *gracilis* of *Vulpia sciuroides*, mentioned by ASCHERSON and GRAEBNER is such a depauperate form and of no value. The var. *Broteri* is the *Vulpia Broteri* BOISS. et REUTER, which is treated by HACKEL in his Catalogue raisonné des graminées du Portugal (1880), as a distinct species.

It is important to note that the name *Festuca bromoides* L. was used for our species by various American agrostologists. PIPER accepted it in his „North American Species of Festuca" (Contrib. U. S. National Herbarium, Vol. X [1906]) under his subgenus *Vulpia* (GMEL.) HACK. on p. 18 and HITCHCOCK used the name in his different works on grasses. Recently, however, in his „Manual of the Grasses of the United States", published in the year 1935, he took up the name *Festuca dertonensis* (ALL.) A. et G., saying that the species has been referred to *Festuca bromoides* L. by American authors (l. c. p. 63). In his list of the synonyms on p. 857 no. 4, he gives the observation that this is the species referred to *Festuca bromoides* L., but that seems to be a mixture; the name being referred to *Festuca Myurus* by European authors. This is not correct. *Festuca bromoides* L. is not a mixture, although European authors, such as ASCHERSON and GRAEBNER refer *Festuca bromoides* partly to *F. dertonensis* and partly to *F. uniglumis*. It is quite impossible to place the name *Festuca bromoides* as a synonym under the very different species, commonly called *Festuca uniglumis* SOLANDER in AITON Hort. Kew. ed. I. 1. (1789) p. 108. The authors of the Synopsis give LINNÉ's name under SOLANDER's species as „pro parte", but „not Herb. Linné". For *Festuca uniglumis* SOL. there is an earlier name, the *Festuca fasciculata* FORSK. Fl. Aeg. (1775) p. 22, a name already used by HACKEL and BRIQUET in their revision of the grasses from the Haller Herbarium

(l. c. p. 81), a name, being, according to those authors „le plus ancien nom, qui doit être rétabli”. The same authors express their doubt as to the name of *Stipa membranacea* L., described in the year 1753 in the *Species Plantarum* p. 560. They affirm that the specimen in the herbarium of LINNÉ belongs to *Festuca fasciculata* and that the type locality is correctly indicated by LINNÉ. If we control the description of *Stipa membranacea* L., we find that it is applicable to *Festuca fasciculata* with exception of the words „panicula laxa”.

We have here once more one of those curious questions; how is it possible that LINNÉ, the founder of the genus *Stipa*, could place in that genus so different a plant of the *Festuceae*. Before we explain this, we must first say something about DUVAL-JOUE's ideas.

DUVAL-JOUE, very interested in the family of the grasses, wrote in the year 1866 an article „L'Herbier de Linné et les graminées françaises d'après les travaux de Parlature, Hartman et Munro”. This paper was published in the „Bulletin de la Société botanique de France”. DUVAL-JOUE adopted *Stipa membranacea* L., saying that LINK was correct when he conserved this name as *Vulpia membranacea* (L.) LINK. He observed however that PARLATORE pointed out that *Festuca uniglumis* SOL. has a nearly wanting lower glume, whereas *Stipa membranacea* has a more developed one. PARLATORE therefore renamed *Stipa membranacea* and called it *Vulpia Linneana*. In PARLATORE's later works this *Vulpia Linneana* disappears. Indeed the differences are of minor importance. DUVAL-JOUE had already stated such very small differences and concluded that there are in this case not two different species and that *Stipa membranacea* is identical with our *Vulpia uniglumis*, but 14 years later in his already mentioned work on the *Vulpias* of France, he changed his mind and accepted the name *Vulpia uniglumis* (l. c. p. 32). We find there a very critical study of the various data and all the doubts that are put forward by him. Giving LINNÉ's description in extenso, he says that it is impossible for him to believe that LINNÉ, who described the genus *Stipa* which is strictly one-flowered, could have placed into it a grass, where each spikelet contains 4—6 flowers, each flower without an articulation between the lemma and the awn and with pedicels of the spikelets not being margined nor membranaceous. DUVAL-JOUE finishes his treatment of this species saying that one may find in the herbarium of Linné on the sheet of *Stipa membranacea* the *Vulpia uniglumis*, as indicated by SMITH, PARLATORE and MUNRO, there is no doubt, but this is in his opinion a transfer, or LINNÉ had been: „le jouet d'une illusion incompréhensible”.

Stipa membranacea is a valid name, although given without generic description. This is against our modern rules of nomenclature, compare the case of *Eragrostis minor* Host, published without description of the genus, the latter being described afterwards in the year 1812 by BEAUVOIS. The name *Eragrostis minor* is therefore rejected and this well-known species has to bear the name *Eragrostis poaeoides* BEAUV.. To avoid many difficulties we have, however, accepted in the rules of nomenclature that in the case of the species of LINNÉ, the names are valid even without generic descriptions. *Stipa*, *Apluda*, *Aristida*, *Andropogon* and so many other genera proposed for the first time in the year 1753 are thus valid, although they are described as genera in the *Genera Plantarum* ed. V in the year 1754.

Stipa membranacea L., being a *Vulpia*, has therefore to bear the name given by LINK. If we study *Vulpia uniglumis* exactly we can better understand some of LINNÉ's puzzling characters. The pedicels, given as dilatated and membranaceous, are in our species very acute and narrowed towards the base, they are enlarged upwards and broadest at the summit, they look like the long callus of the genus *Stipa*; being more or less compressed, LINNÉ could describe them as ancipitate and somewhat obtuse. In transmitted light the pedicels are thicker and darker at the middle, thinner and somewhat transparant at the sides. With spikelets before us we can understand these characters although they are not extraordinarily striking; it may be that LINNÉ also observed the branches of the panicle and the axis, which are more distinctly compressed and evidently membranaceous. Since the first glume is often but a rudiment, it may be that LINNÉ overlooked it, taking the second glume for the first one and the first lemma for the second glume. *Vulpia uniglumis* has often but two developed flowers and it is thus evident that in such a case LINNÉ saw but one flower. This agrees with our own observations, if we study a detached spikelet superficially and if we neglect the few short sterile lemmas which moreover easily fall off. If we look at the fertile flowers of the spikelet, we find that among all the *Vulpias* they agree the best with the lemma of a *Stipa*, having a very long awn, as long as the body of the lemma. Now LINNÉ says in his description: „calycis arista longitudinae aristae corollinae”, which agrees with the characters of *Vulpia uniglumis*. I observed that the second glume has a total length of 3 cm, the body being as long as the awn, which is about 1,5 cm long; the first lemma was 38—40 mm long and the body of the lemma about 2 cm long. These data are quite in accordance with those given by LINNÉ and cited by me above. Other characters given by

LINNÉ are of minor importance, but they correspond also to *Vulpia uniglumis*. The grass is scarcely a foot high, often less so, the panicle is simple and scarcely divided, quite as in *Vulpia uniglumis*, often not very long and „debilis“, and sometimes more or less interrupted (interpreted by LINNÉ as „laxa“). The locality given by LINNÉ is correct as the species is known from Spain. „Habitū Avenae“, says LINNÉ, which applies to a more than one-flowered plant with long awns.

If we take all these data into consideration, there is in my opinion no objection to accept the specimen in the herbarium of LINNÉ as representing *Stipa membranacea* and although the name is not well-chosen and the plant placed in a wrong genus, it is not allowed to neglect the name and therefore we have to use the name *Vulpia membranacea* (L.) LINK for the plant commonly named as *Festuca uniglumis* SOLAND. or *Vulpia uniglumis* DUMORT..

There is in LINNÉ's *Species Plantarum* another *Vulpia*, which was described by him as *Festuca incrassata* L., a name not mentioned in the *Index Kewensis*. Because this name was published in the first authentic edition, on p. 75 no. 6, it is valid and ought to be accepted by every botanist. Now it is known that in different specimens of the *Species Plantarum* page 75 is taken away and replaced by another one, where we find under no. 6: *Festuca maritima* L. with a quite different diagnosis and with different references. See for this question WILHELM JUNK's interesting article „Linné's *Species Plantarum* editio princeps und ihre Varianten mit Beschreibung einer neuen. Mit 12 Facsimile-Tafeln. Berlin 1907.“ Very worth reading is his page 12, where the various data are mentioned. The new *Festuca maritima*, received by LINNÉ from LOEFFLING, was once more published in the second edition of the *Species Plantarum*. We do not know why LINNÉ ordered, during the printing of his work, to replace page 75 by another one. He probably tried to withdraw his *Festuca incrassata*, because it was based by him partly upon a reference to BARRELIER and SCHEUCHZER, which had become suspect to him.

Going over the diagnosis of *Festuca incrassata*, over the references, the locality and the rather long note, it is interesting to see that *Festuca incrassata* is certainly a *Festuca* from the subgenus *Vulpia* HACK.; being the first name and validly published, it must be applied to a species of *Vulpia*. There is however another *Vulpia* described as *Festuca incrassata* SALZMAN, which was published without any other reference by LOISELEUR in the second edition of his *Flora Gallica* in the year 1828 (p. 85). The name given by SALZMAN is therefore a homonym. If we

treat this *Vulpia* as a *Festuca*, the nomenclature is easy enough for we have then to look only for a new name to give to the species of SALZMAN, whatever the *Festuca incrassata* further may be. *Festuca incrassata* L., being a *Vulpia*, as I shall explain afterwards, cannot be named *Vulpia incrassata* as there is already a *Vulpia incrassata* PARLATORE (1841), which is based upon *Bromus incrassatus* LAMARCK, Enc. I. (1783) p. 469. In the genus *Vulpia* the combination *Vulpia incrassata* (LAMK.) PARL. is thus valid and to be used for the same species as described in LOISELEUR's Flora. By a curious coincidence both names given by SALZMAN and by LAMARCK belong to the same species although described under two different genera *Bromus* and *Festuca* but with the same specific name. In LOISELEUR's Flora there is no reference to the *Bromus incrassatus* LAMK.. PARLATORE's combination is to be accepted unless there is an earlier name, given before 1783.

Let us first treat LINNÉ's *Festuca incrassata*. His diagnosis: „panicula subnutante secunda, pedunculis incrassatis, aristis calycinis longitudine flosculorum”, points to the species which is generally named *Vulpia ligustica* LINK, which is based upon *Bromus ligusticus* ALLIONI (1785). This species has a secund, lax panicle with nodding branches and the pedicels of the spikelets are compressed, enlarged upwards and obovate, moreover the upper glume is as long as the spikelet, the awn as long as its lemma. In a note LINNÉ says: „singulare quod pedunculi membranacei floribus fere crassiores. Calyceinae aristae non breviores aristis flosculorum”. He finds it thus very striking that the pedicels of the spikelets (named pedunculi by him) are nearly thicker than the spikelet and membranaceous, which is however exactly the case in *Vulpia ligustica*. The habitat, given as Spain, is not correct, as *Vulpia ligustica* LINK, although common in Southern Europe, is not known from Spain.

Finally there is LINNÉ's reference: „Gramen festuceum myurum elatius, spica heteromalla, gracili. Barr. ic. t. 99. f. 2. Scheuch. gram. 293?”. SCHEUCHZER's plant does not belong to *Vulpia ligustica*. The latter is SCHEUCHZER's Gramen bromoides festucea tenuique panicula minus p. 296 and was placed by LINNÉ himself in the second edition of the Species Plantarum wrongly under *Bromus distachyos* (p. 1677) which was published already in Amoen. Acad. IV. (1759) p. 304. This plant is our well-known *Brachypodium distachyon* (L.) ROEM. ET SCH. (1817). SCHEUCHZER's plant under *Festuca incrassata* L. is the well-known *Vulpia Myurus* GMEL..

THELLUNG placed the *Festuca incrassata* L. under *Festuca ligustica* in his Flore adventice de Montpellier. (1912) p. 129 with a query, citing:

„L. Spec. pl., 1753, ed. pristina, p. 75, excl. syn. Barr. — non alior.” He had no difficulties with *Vulpia incrassata* PARL., because he placed that plant in another genus on p. 121 of his flora. We find there both *Bromus incrassatus* and *Vulpia incrassata* as *Cutandia incrassata* (LAM.) JACKSON Ind. Kew. (1893) p. 675. This was probably done because BENTHAM, taking up the genus *Cutandia*, described by WILLKOMM in the year 1860, indicated that *Festuca incrassata* SALZMAN belonged to *Cutandia* although BENTHAM did not make new combinations in the genus *Cutandia*. See BENTHAM, Notes on Gramineae, in Journ. Linn. Soc. Botany, Vol. XIX (1881) p. 118 (under *Cutanda*) and further BENTHAM et HOOKER, Genera Plantarum, Vol. III. (1883) p. 1188 (under the correct name *Cutandia*).

Festuca incrassata SALZM. is treated by ASCHERSON and GRAEBNER in their Synopsis as a member of the section *Vulpia*. HACKEL discussed the genus *Cutandia* in the „Moniteur du Jardin Botanique de Tiflis”, livr. XXIV (1912). He limited this genus to those species where the axis of the panicle is articulated, such as *Cutandia memphitica* (SPRENG.) RICHTER, *Cutandia dichotoma* (FORSK.) BATT. ET TRAB. and *Cutandia divaricata* (DESF.) RICHTER. He says: „*Cutandia incrassata* returns to *Festuca*, the other ones, placed by Bentham in *Cutandia* go to *Scleropoa*.” The type of WILLKOMM’s genus *Cutandia* is *C. scleropoides* WILLK., which is the same as *Cutandia memphitica* (SPRENG.) RICHTER. Only those species which group themselves round this *C. memphitica* are to accept as members of this genus. I have to remark only that the valid combinations in *Cutandia* are those of RICHTER in the year 1890.

Since so many references of LINNÉ proved to be wrong, as is already explained by me above, the one under his *Festuca incrassata* must be accepted as a misinterpretation and our conclusion is therefore that the diagnosis of LINNÉ and his description belong very probably to *Vulpia ligustica*. But even if there are objections to place LINNÉ’s species there, we are happy to find that this is not important because a combination with LINNÉ’s species as basis cannot be accepted on account of the existing *Vulpia incrassata* (LAMK.) PARL.. If perhaps the latter has to bear an earlier name, we never can take it up for LINNÉ’s species. Therefore the well-known name *Vulpia ligustica* (ALL.) LINK is safe.

This we cannot say as to the name *Vulpia incrassata* (LAMK.) PARL., for which the date of priority is the year 1783. It is not possible that this species was described between 1753 and 1783? To find it out we must know if there are more species, belonging to *Vulpia*, described by LINNÉ. Indeed there are still two species, one of them is *Bromus genicu-*

latus L. described in Mantissa, I. (1767) p. 33., the other is *Bromus stipoides* L., described in Mantissa, II. (1771) p. 557. Both species are placed by ASCHERSON and GRAEBNER under *Festuca geniculata* WILLD., which is the plant generally called *Vulpia geniculata* (L.) LINK.

In this case we could presume that LINNÉ described under *Bromus* the same species twice, which, however, appears to be not true on studying the descriptions. Let us first take LINNÉ's *Bromus geniculatus*. This species is accepted by all authors who treated it, as the *Vulpia geniculata* of LINK and the specimen in LINNÉ's herbarium is the plant going under LINK's name. Fortunately, LINNÉ did not give references but a rather long description of his own. All the characters given by him agree with the type in his herbarium and with the well-known plant, so common in the mediterranean region. This question is quite settled as *Bromus geniculatus* has priority above *Bromus stipoides*. DUVAL-JOUE accepted both species of *Bromus* of LINNÉ as being the same, an incorrect opinion, copied by ASCHERSON. He treated the species under *Loretia geniculata* in his *Vulpias* of France (l. c. p. 36) saying that the name *geniculatus* is wrong because the species is far from being always geniculate; he says further: „C'est là ce qui fit que, en 1771, le même auteur, recevant la même plante, — culmis plurimis erectis, — la crut différente et la publia sous le nom de *Bromus stipoides*, Mant. alt., pag. 557, lui donnant ce nom parce qu'il lui trouvait certains rapports avec son *Stipa membranacea*, „Diversus a *Stipa membranacea* et genere et habitu, pedunculis licet conveniat" (l. c. p. 558)". Here the famous French agrostologist was wrong. It is not very probable that LINNÉ afterwards in the second edition of his Mantissa, described the species he had in his herbarium already as *Bromus geniculatus*, once more as *Bromus stipoides*. This *Bromus stipoides* is a *Vulpia* too and indicated as growing in Majorca. From the description which is very different from that of *Bromus geniculatus*, we learn various things for the identification, especially that the leaves are shorter than the culms, the oblong panicle is brownish (which is never the case in *Bromus geniculatus*), the spikelets are placed in clusters of three, the middle one being unispiculate, the lateral ones 2—3-spiculate. LINNÉ says intermedio 1-floro, lateralibus 2—3-floris. He certainly means „spikelets" when saying „flores", because after the character of the compressed, obtuse, upwards broadest pedicels, the „flores" are given as 4-flowered. The calyx is subulate and glabrous and the „corolla petalo exteriore arista recta, longit. floris", which means that the lemma bears an erect awn as long as its body. The linear anthers are yellow, from which we conclude that the flowers are chasmogamic,

in the cleistogamic *Vulpias* the anthers are not linear. Chasmogamic are among the *Vulpias* only *Vulpia Alopecurus* (SCHOUSB.) LINK (which does not come into consideration), further *Vulpia ligustica* (ALL.) LINK (with a very different panicle), *Vulpia sicula* (PRESL) LINK (a quite different perennial species), *Vulpia geniculata* (L.) LINK (described by LINNÉ himself), *Vulpia incrassata* (LAMK.) PARL. and *Vulpia tenuis* (TINEO) PARLATORE. Only the last two species come into consideration to be compared with LINNÉ's *Bromus stipoides*. Both species are, moreover, known from the Balears, the type locality of *Bromus stipoides*. It is especially the *Vulpia incrassata* PARL. which has the construction of the panicle branches in groups of three as indicated so exactly by LINNÉ. We find further under *Bromus stipoides* more important characters. Differing from *Stipa membranacea* (qui similis in Systema XIII), „et genere et habitu”, indeed the habit is very different, „pedunculis licet conveniat”, *Stipa membranacea* is thus indeed a *Vulpia*, as already pointed out by me above, „cum stipae aristae semine 4-plo longiores, huic vix seminis longitudine”. This agrees too, as *Vulpia membranacea* (*uniglumis*) has often a very long awn, whereas in *Vulpia incrassata* PARL. the awn is scarcely as long as the body of the lemma and mostly much shorter. From all these characters I am convinced that the *Bromus stipoides* L. is a true *Vulpia* which has to bear the name of *Vulpia stipoides* (L.) DUMORTIER, a combination given in the year 1823. Having worked out these different data, I saw to my satisfaction that the name *Festuca stipoides* was accepted for the same species as I did, by RICHTER in his *Florae Europaeae* as *Festuca stipoides* (L.) DESFONTAINES.

DESFONTAINES identified indeed the species he treated in his *Flora Atlantica* with LINNÉ's *Bromus stipoides*, citing LINNÉ and making the combination under *Festuca*. He had, however, a different plant or several different plants before him; nevertheless the combination is valid as the combination is based upon LINNÉ's name. Compare the case of *Digitaria filiformis* (L.) KOELER, a name for an American plant, although KOELER described another European species. I explained this case already in an earlier paper.

Concerning the nomenclature in the genus *Vulpia*, our conclusions are therefore, that of the six species of *Vulpia*, mentioned by LINNÉ under various genera, five have to be accepted under the specific names given by him.

Among the *Vulpias* there are some species where the lemmas have a very long pubescence. The first species is a very beautiful plant, named *Vulpia Alopecurus* (SCHOUSB.) LINK, being described as *Festuca ciliata*

LINK in SCHRADER's Journal f. Botanik II, (1799) p. 315. On account of the earlier *Festuca ciliata* GOUAN from the year 1768, this name is invalid. The species is easily recognizable by its very large spikelets, which are, without the awns, about $1\frac{1}{2}$ cm long. The flowers are chasmogamic with 3 stamens.

Another species with very long hairy spikelets is the *Festuca ciliata* of DANTHOINE, in LAMK. et DC. Fl. Franc. III (1805) p. 55. As is clear from the data given above under *Vulpia Alopecuroides*, this name is also a homonym and therefore changed by ASCHERSON and GRAEBNER into *Festuca Danthonii* in their Synopsis Vol. II. (1901) p. 549, which, transferred to *Vulpia*, becomes *Vulpia Danthonii* VOLKART in SCHINZ et THELLUNG, Fl. Schweiz, ed. II. p. 57. It was a great pity that such a good specific name as *ciliata* could not have been used but the authors of the Synopsis neglected the fact that there were other valid names for the species. They united with their species the *Festuca ambigua* LE GALL, Flore de Morbihan (1852) p. 731, which was transferred to *Vulpia ambigua* by A. G. MORE in Journ. Linn. Soc. V. (1861) p. 190. In his paper: On the occurrence of *Festuca ambigua* in the Isle of Wight, he tells us that this grass grows abundantly on the sea-side sandhills or dunes at St. Helen's, in this island. He treated the differences with *Vulpia pseudo-myurus* SOY.-WILLEM. (which is as we know at present the true linnean *Festuca Myurus*) and with *Vulpia uniglumis*. The latter has 3 stamens and is our *Vulpia membranacea* (L.) LINK. MORE's very interesting article gives us further important notes. He says that the resemblance to *V. uniglumis*, is only superficial, as a closer examination shows the true affinity to *Vulpia pseudo-myurus* (*F. Myurus* L.), with which it agrees in the important character of the single stamen and by the constant presence of both glumes, moreover the upper glume of *Vulpia ambigua* is destitute of the awn, found in *Vulpia uniglumis*.

From these data we clearly gather that *Vulpia ambigua* is totally different from *V. uniglumis* (*membranacea*). Having obtained access to LE GALL's Flore de Morbihan, MORE feels himself satisfied that his plant, distributed by him formerly as *Vulpia pseudo-myurus*, var. *maritima*, answers to the description of *Festuca ambigua*. LE GALL considered his plant more nearly related to *Vulpia ciliata* LINK, (Hort. Berol. I. (1827) p. 147), to which he was disposed to refer his species as a non-ciliated variety. It must be admitted that, except for the cilia of the lemmas, *Vulpia ambigua* has very nearly the characters of *Vulpia ciliata*. The *Festuca ambigua* was described from the north-west coast of France as mentioned in the works of LE GALL and LLOYD. MORE gives a key

to distinguish the 3 species, this key shows clearly that *Vulpia ambigua*, although having lemmas without cilia, is more allied to *Vulpia ciliata* LINK and the proportions of both glumes in *Vulpia ambigua* (1 to 3—6) are nearly the same as in *Vulpia ciliata* (1 to 3—5), although we must not forget that in the true *Vulpia Myurus* GMEL., such proportions occur too. There is known a variety *subuniglumis* HACK. of *Vulpia Myurus* where this proportion is 1 to 5 or even 1 to 10.

DUVAL-JOUVE (*Vulpia* de France l. c. p. 47) says, however, that *Festuca ambigua* LE GALL belongs to *Vulpia Myurus* GMEL., being: „une forme du littoral de l'Ouest, à glume supérieure obtuse (?).” LLOYD has described this upper glume in his Fl. Ouest, ed. 3, p. 371, as acute, obtuse or truncate. Why there occur obtuse upper glumes is clearly explained by DUVAL-JOUVE (l. c. p. 30), the delicate membranous point of the glume breaks off easily as is demonstrated by microscopic examination. The obtuse upper glume is thus an accidental character and there is in my opinion no argument to accept DUVAL-JOUVE's identification. If we have to unite *Vulpia ambigua* with one of the other species of the genus, we have to place it under DANTHOINE's *Festuca ciliata*.

In doing so, the earlier epithet *ambigua* ought to have been accepted for DANTHOINE's species. The Kew Index refers *Festuca ambigua* to *Festuca Myurus*. Now there is still an earlier name, *Vulpia aetnensis* TINEO, Pl. rar. fasc. III. (1846) p. 22, a name accepted by RICHTER as belonging to a distinct species, *Festuca aetnensis*, but placed by ASCHERSON and GRAEBNER as forma *aetnensis* under their *Festuca Danthonii*. This *Vulpia aetnensis*, described from Sicilia, where the *Festuca Danthonii* is common, differs according to the authors of the Synopsis but little from the typical *Festuca Danthonii*, in the longer awns of the lemmas. Going over a rather large material of *Festuca Danthonii*, represented by specimens from West Europe to Asia minor and North Africa, it is easy to see that the awns of the lemmas are very variable in length. Mostly they are about as long or slightly longer than the body but not rarely the awns are up to three times as long as the body and such specimens are not confined to Sicilia.

JANKA published a key to the *Vulpias* in the Oest. Bot. Zeit. XVI (1866) p. 216. Here we find *Vulpia aetnensis*, placed next to his *Vulpia Myurus*; the latter he defines as „arista palea paullo longior; palea inferior margine dense ciliata”. This proves that JANKA accepted the *Vulpia Myurus* in the sense of SOYER-WILLEMET, who, as is known, named the true *Festuca Myurus* of LINNÉ as *Festuca pseudo-myurus*. Opposite to the characters of JANKA's *Vulpia Myurus* (our *Vulpia Danthonii*), we

find the characters of *Vulpia aetnensis*, given as: „arista palca 3-plo longior, palea inferior sparse ciliata”.

As to the identification of TINEO's *Vulpia aetnensis*, it is interesting to memorate STROBL's work on the flora of Sicilia. He visited the island many times and brought together a very large herbarium of the region of the Nebrodes. For the publication of a flora, he studied the different herbaria concerning the island of Sicilia, among them also GUSSONE's Herbarium siculum at Napels, which contains the types of TINEO. STROBL's work was published as „Flora der Nebroden mit Bezug auf die Flora ganz Siciliens”, in the well-known periodical „Flora” at Regensburg. This work of STROBL was issued in parts during the years 1878—1888. There exist rare copies with consecutive pagination. In such a copy we find that *Vulpia ciliata* LK. was treated on p. 121 (p. 287—288, as published in Flora 1879) with the varieties *genuina* and *aetnensis*. STROBL says emphatically that *Vulpia aetnensis* was issued as a „species” by TINEO FIL. in the year 1846 in Plantarum rariorum Siciliae minus cognitarum fasciculi III. Although STROBL cites „var. aetnensis”, we know thus that there is a valid publication of the „species” *Vulpia aetnensis*. I wish to quote here STROBL's phrases, (l. c. p. 121—122). „Diese Pflanze, die ich im „Nachtrage zum Herb. Guss., sowie im Herb. Catania's aus der Hand „Tin. sah, unterscheidet sich von den in Sizilien gewöhnlichen, kleineren „Exemplaren der *ciliata* absolut durch nichts, als durch die spärlicher, und „zwar nur am Rande bewimperten Spelzen, ein Merkmal, das ich auch an „der *ciliata* Istriens, der Nebroden etc. zu wiederholten Malen traf und das „mit der auf dem ganzen Rücken- oder nur auf dem Rücken- und Rand- „nerven bewimperten Hauptform durch die mannigfachsten Uebergänge „verbunden ist, wie ich auch in der That auf dem Originalstandorte Tin. „bei Nicolosi sowohl *cil.*, als *aetn.*, aus auch Zwischenformen antraf; es hat „daher diese Tineische Art kaum den Werth einer Varietät.”

Not a single argument can, in my opinion, be found to accept *Vulpia aetnensis* as a different species; it is to be united with *Vulpia Danthonii* and being described already in the year 1846, its name has priority over *Vulpia ambigua* and is to be accepted for our species. ASCHERSON and GRAEBNER say under *Festuca Danthonii*: „because the name *Festuca ambigua* refers to a not typical form, a new name had to be formed.” This is however not according to the rules of nomenclature.

Since DANTHOINE's species occurs in a glabrous state too, it becomes still more difficult to distinguish it from the *Vulpia Myurus* GMEL. and it is the great merit of DUVAL-JOUE to have so exactly pointed out the differences. ASCHERSON's description in the Synopsis (l. c. p. 550) is quite

erroneous, as the small, but distinct lower glume is overlooked, so the upper one was accepted for the lower and consequently the first lower lemma was regarded as the upper glume, indicating this upper glume as „awned”, the awn as long as the body of the glume and „long hairy at its base”. We know that the second glume is not awned at all and perfectly glabrous, whereas the lowermost lemma is hairy on the back and provided with a long awn, the other lemmas are hairy along their margins. DUVAL-JOUE gave an excellent description in latin, followed by another one in french (l. c. p. 44—45); although it often much resembles the true *Vulpia Myurus* GMEL., especially in the glabrous state, it is in its biological characters quite different, approaching only to small specimens of *Vulpia Myurus* var. *hirsuta* HACK. from Portugal, where the lemmas are hairy along the margins and often also on the back. This variety is identified by American agrostologists as *Vulpia megalura* (NUTT.) RYDBERG, the latter is accepted by them as a distinct American species, said to be introduced from the New World into Portugal. This *Festuca megalura* NUTT. is often found adventitious in Central Europe, also in the Netherlands by myself. It is, according to PIPER and HITCHCOCK, a remarkably constant species in America. I saw it in herbaria often mixed with the true *Festuca Myurus*, not only in North American but even in South American, but never in Old World collections.

The occurrence of *Vulpia Myurus* GMEL. in South America, leads us to the question, whether there exists in South America another *Vulpia* described by KUNTH in the year 1822 as *Festuca muralis*, which was based upon the *Festuca Myurus* as described by HUMBOLDT, BONPLAND and KUNTH in their Nova Genera. Vol. I. (1815) p. 155 from Quito. The long description, given there, fully applies to our *Vulpia Myurus* GMEL., the lower glume is given as $\frac{1}{3}$ as long as the upper one and the lemma as green and scabrous. KUNTH cited in his Synopsis Plantarum. Vol. I. (1822) p. 218, the same description of the Nova Genera and the same locality. He tried to differentiate his *Festuca muralis* but not a single diagnostic character is given. In GAY's Flora Chilena, Tom. VI. (1853) p. 425—426, DESVAUX treated this *Festuca muralis*, giving a latin diagnosis and a long spanish description, mentioning in both, that the palea inferior (lemma) is glabrous or scabrous and with hairs along the margins. In a note he says that the plant is variable but identical with the typical specimens of the *Festuca muralis* of KUNTH. The frequent presence of hairs on the lower palea is, in his opinion, not sufficient to separate the Chilean plant from the European one. If indeed KUNTH had the plant with hairy lemmas before him, he would certainly have indicated that,

but he says only that the flowers are scabrous. DESVAUX is rather certain that *Festuca muralis* KUNTH does not differ from *Festuca Myurus* L. It is noticeable that in STUCKERT's „Tercera Contribución al conocimiento de las gramináceas argentinas”, in Anal. Mus. Nac. Buenos Aires. Tom. XIV (1911) p. 116, *Festuca Myurus* and *Festuca muralis* are mentioned as two different species, so that it may be possible that *Festuca muralis* is an allied, hitherto overlooked species. Being a *Vulpia* it must in that case bear the name of **Vulpia muralis** (KUNTH) HENR.. In STUCKERT's work a spanish description is given, although it is but short, it gives us some characters which do not apply to our european *Vulpia Myurus*. The panicle is described as simple, all the glumes are glabrous, the lanceolate spikelets are compressed with 5—9 flowers, with awns being longer than the length of the lemmas and the latter without hairs. From these data we conclude that STUCKERT had here a different species before him. The distribution of this *Festuca muralis* is given by him as Patagonia, Chubut, Buenos Aires and further Chili and Peru. This plant is not mentioned by HITCHCOCK in his work on the grasses of the High Andes.

There is in South America another puzzling *Vulpia* which was mentioned for the first time by NEES in his Flora Brasiliensis, Vol. II (1829) p. 474. Unfortunately NEES identified it with *Festuca tenella* WILLD. and described it under that name. He divided his *Festuca tenella* into two varieties, the var. *spontanea*, with a shorter culm and awns twice as long as the lemmas and a var. *culta* „ex America boreali”, with a longer culm and awns shorter than the less scabrous lemmas. To this variety from North America belong all the synonyms given by NEES, also *Festuca octoflora* WALT., the name accepted in the manuals of the grasses of North America. NEES's description points however to the plant collected near Montevideo by SELLOW, which was seen by him in the Berlin Herbarium. In his description the awn is given as twice as long as the lemma, whereas in the North American *Festuca octoflora*, according to PIPER, the lemma is 5 mm long, with an awn 1—7 mm long. DOELL accepted the species under the name of *Festuca tenella* WILLD. in MARTIUS's Flora Brasiliensis. NEES recognized the South American plant afterwards as different from the *Festuca octoflora* and named it *Festuca australis*, a name published in the year 1854 by STEUDEL in his Synopsis Pl. Glum. I. p. 304. *Festuca australis* NEES is accepted by HITCHCOCK in his work on the Andean grasses and taken up by me as **Vulpia australis** (NEES) HENR. nov. comb..

It is also possible that we have to unite *Vulpia muralis* and *Vulpia australis*. If it would come to that, the species has to bear the name of *Vulpia muralis*. PIPER, who treated *Festuca octoflora* in his

work (l. c. p. 11) gives the distribution but says that he did not see specimens from Mexico or from Central or South America, though it is reported from Brazil by DOELL as *Festuca tenella* WILLD.. In Mexico (Lower California) *Vulpia octoflora* (WALT.) RYDBERG was detected in the year 1889 by PALMER, together with its variety *hirtella* (PIPER) HENR. nov. comb. Because DOELL's *Festuca tenella* is the same as *Vulpia australis*, it is possible that *Festuca octoflora* WALT. is not an inhabitant of South America but represented there by the vicarious species *Festuca australis* NEES.

Apart from the two insufficiently known species, there occur in South America four other species. *Festuca megalura* NUTT., *Festuca Myurus* L. and *F. bromoides* GRAY are taken up in the Flora Chilena by DESVAUX, where *Festuca megalura* is not accepted as specifically distinct. We find in Chile a species with hairy spikelets, described as *Festuca eriolepis* DESVAUX, which becomes *Vulpia eriolepis* (DESV.) HENR. nov. comb.. We know that STUCKERT mentioned three species for Argentina (*F. muralis*, *F. Myurus* and *F. sciuroides*) and HITCHCOCK accepted *F. megalura*, *F. australis* and *F. bromoides*. In his key on p. 319 of the Grasses of the High Andes, HITCHCOCK tried to differentiate *Festuca australis* and *Festuca bromoides*, the lemma of *F. australis* is given as 5 mm long, that of *F. bromoides* as about 1 cm long. I have never seen such long lemmas in *F. bromoides* and PIPER gives them as 7—8 mm long. The distribution of *Festuca australis* is given by HITCHCOCK as throughout South America at temperate altitudes, whereas *Festuca bromoides* is accepted as introduced from Europe in several places in South America. A sharp limitation of the South American *Vulpias* can only be given after a renewed study of the types.

For the flora of Uruguay, ARECHAULETA (Las Gramíneas Uruguayas, 1894) mentions three species of *Festuca* which belong to the genus *Vulpia*. His *Festuca tenella* WILLD., said to be frequent, is probably identical with *Festuca australis*. His *Festuca geniculata* is not the species so named in our European floras but as to ARECHAULETA's description and his plate (the latter is named *Festuca geniculata* v. *monandra*) a mixtum of two species, the var. *genuina* is the *Festuca megalura* NUTT. and the var. *glabrescens* is probably the *Festuca Myurus* L.; ARECHAULETA's *Festuca ciliata* LINK, cited also as *Vulpia Myurus* REICHENBACH, is not our European *Festuca ciliata*, it may be *Festuca bromoides* L.. Two years afterwards, two species were treated by SPEGAZZINI in „Contribucion al estudio de la Flora de la Sierra de la Ventana” p. 74—75. The first species is „*Festuca myurus* LIN. var. *muralis* KNTH—STEUD., l. c., f. 303.”

In his Spanish description no differences are found to distinguish the plant from typical *Festuca Myurus* L. The other species of SPEGAZZINI was named by him as *Festuca delicatula* LAG.—STEUD., l. c., f. 34 (wrong indication for f. 304.). As to this description we are inclined to accept this plant as the *Festuca australis* NEES, which has in its habit a great resemblance to the Spanish plant described by LAGASCA, which however belongs to the species with a rather short lower glume, whereas SPEGAZZINI mentions the glumes as being 3 and 5 mm long. ARECHA VALETA's determinations are wholly taken from DOELL's treatment in *Flora Brasiliensis*, Vol. II. pars 3 (1878) p. 112. We find there: *Festuca tenella* WILLD. which is SELLOW's specimen from Montevideo and the type of *Festuca australis* NEES. The second species is *Festuca geniculata* WILLD. var. *monandra* DOELL, which is quite spurious. DOELL says that the type of *Festuca geniculata* is not rare in Southern Europe and Africa, his variety was represented in the Berlin Herbarium, with a label in French, said to be collected at Buenos Aires. In my opinion this specimen is not from South America and the indication on the label is wrong, the plant, being monandrous, certainly does not belong to *Vulpia geniculata*. The third species is *Festuca ciliata* LINK, the genuine plant is according to DOELL, not collected in South America, his var. *glabrescens*, however, at Montevideo (SELLOW d. 2252 in herb. Berol.), it is given by DOELL as being intermediate between *Festuca ciliata* and *Festuca bromoides*. It is probable that this plant indeed belongs to the latter, which is introduced in many places all over the world.

Finally we would remark that some species of North America are difficult to distinguish, so there are forms of *Vulpia pacifica* (PIPER) RYDBERG which much approach to *Vulpia bromoides* and therefore also to *Vulpia australis* and also to few-flowered specimens of *Vulpia octoflora* RYDB.

Although thus the *Vulpias* are well-recognizable by their general aspect, by their spikelets, being dilatated towards the summit during the flowering-time, and especially by the short filaments and stigmas, which are included between the lemmas and paleas, it is not an easy problem to distinguish the species by constant and sharp characters, which is one of the principal requirements for a key to the species. There are all over the world some 30 species. The *Festuca pectinella* DEL. is not accepted as a member of the genus *Vulpia* but belongs to a distinct genus *Ctenopsis* DE NOT.; in this I fully agree with TRABUT and STAPP. In the Old World there are about 20 species, the New World has about 13 ones. Some of them are common to both regions. If we

go over them with the literature at hand, we find a very curious difference as to the treatment of the indumentum of the spikelets. In the American literature, this character of the indumentum is emphatically indicated as very constant and very important to recognize the species, while in the Old World, nearly all the species possess both glabrous spikelets and pubescent or hairy ones, so that we meet with the curious fact that for a key to the American species this character can be accepted and is actually used by PIPER and HITCHCOCK, whereas the same character is unfit for our Old World species.

In order to show this feature more in detail, let us first consider the European species. *Vulpia Alopecuros* (SCHOUSB.) LINK has long-hairy lemmas, but they are perfectly glabrous in var. *glabrata*, there is moreover a variety with all the glumes and lemmas densely hairy, known as var. *lanata*. See WILLKOMM et LANGE, Prod. Fl. Hispan. Vol. I (1870) p. 92. We have already pointed out above that ASCHERSON's *Festuca Danthonii*, typical with hairy lemmas, occurs as a variety with glabrous lemmas, named here *Vulpia aetnensis* TINEO var. **imberbis** (VIS.) HENR. nov. comb.: *Vulpia ligustica* (ALL.) LINK, has a var. *hispidula* PARL. with hairy spikelets. *Vulpia geniculata* (L.) LINK has a variety *ciliata* PARLATORE with ciliate lemmas, this species not rarely occurs in a much more hairy state, described here by me as a new variety: *Vulpia geniculata* (L.) LINK, var. **dasyantha** HENR. nov. var. Pedicelli pubescentes, glumae steriles fertilesque longe adpresse hirsutae. Portugal; bords des champs à Faro, Algarve, 18, IV, 1853, leg. E. BOURGEOIS no. 2053 bis (mixed with typical *Vulpia geniculata* under the number 2053). Type in Herb. Lugd.-Bat.. From the same locality there is in our herbarium also a specimen of this new variety, collected by M. GANDOGER in April of the year 1904. The var. *dasyantha* occurs also in Algeria, where it was collected by B. BALANSA. In his collection there is a specimen from the year 1852. Bords de la route conduisant d'Oran à la Sénia, avril, named by him *Vulpia stipoides*, var.. The same variety was also collected by M. GANDOGER in Morocco near Melilla in April 1908. The var. *ciliata* PARL. has glabrous glumes and lemmas which are only sparingly ciliate along the margins, as is exactly indicated by PARLATORE.

Vulpia Myurus (L.) Gmel. has a var. *hirsuta* HACK. in Portugal, which is not distinguishable from the American *Vulpia megalura* (NUTT.) RYDBERG and *Vulpia bromoides* (L.) GRAY, which is always described as having only scabrous lemmas, occurs as a var. *hebestachya* AZNAVOUR with hairy spikelets, described from Constantinople (Enumération d'espèces nouvelles pour la flore de Constantinople, Magyar Botanikai Lapok.

X. [1911] p. 17). It may be that this var. *hebestachya* belongs to *Vulpia Broteri* BOISS. et REUTER, which is accepted by ASCHERSON and GRAEBNER as a subspecies of *Festuca dertonensis* (our *Vulpia bromoides*). This very interesting variety is described as having „glumis glumellisq. dense hirtulis”.

Vulpia delicatula (LAG.) DUMORT. var. **hirsuta** HENR. nov. var.

Gluma sterilis superior lemmataque distincte hirsutulae.

Spain; Madrid, cum typo. Herb. Huet de Pavillon par Mr. Boissier, ded. Leresche.

In Herb. Lugd. Bat. sub no. 936, 322—153.

Thus it is a fact that we cannot use the character of the presence or absence of hairs on the spikelets to distinguish the European species, unless we accept all those varieties as species. But on the other hand it is striking that some species as *Vulpia membranacea* (L.) LINK are not known with hairy spikelets. The same can be said from *Vulpia Teneriffae* (ROTH) HENR. nov. comb. described by ROTH from the Canaries. The Portuguese *Vulpia Myurus* var. *hirsuta* which is certainly the same as the American *Vulpia megalura* RYDB. ought to be accepted in Europe as a variety together with the hairy varieties which belong to different other species, whereas in America it constitutes a distinct species. In South America both *Vulpia megalura* and *Vulpia Myurus* grow together in the same plot as was seen in specimens collected by HOLWAY in Chile.

Let us now pass in review the North American species as accepted by PIPER and by HITCHCOCK under the genus *Festuca* but transferred by me to the genus *Vulpia*. We have already stated that *Vulpia octoflora* (WALT.) RYDB. occurs with hirtellous spikelets, this variety is not accepted by American agrostologists as a species. All other forms with hairy spikelets are, however, accepted as species. In **Vulpia sciurea** (NUTT.) HENR. nov. comb., the lemmas are appressed-pubescent all over the back. This species is very characteristic by its very small lemmas. *Vulpia pacifica* (PIPER) RYDB. has spikelets not at all hirsute. **Vulpia confusa** (PIPER) HENR. nov. comb. has hirsute glumes and glabrous lemmas. **Vulpia arida** (ELMER) HENR. nov. comb. has glabrous glumes and densely woolly lemmas. **Vulpia Grayi** (ABRAMS) HENR. nov. comb. has the spikelets pubescent to villous. *Vulpia reflexa* (BUCKLEY) RYDBERG has the lemmas scaberulous only. In *Vulpia microstachys* (NUTT.) MUNRO the lemmas are pubescent only, whereas in **Vulpia Eastwoodae** (PIPER) HENR. nov. comb., the spikelets are wholly pubescent. In **Vulpia Tracyi** (HITCHC.) HENR. nov. comb., the glumes are hispid-villous and the lemmas glabrous. In Europe, agrostologists would have united the four species *Vulpia*

reflexa, *V. microstachys*, *V. Eastwoodae* and *V. Tracyi* in one species under the name of *Vulpia microstachys* (NUTT.) MUNRO, whereas *Vulpia pacifica*, *V. confusa* and *V. Grayi* would represent but one species too. If we accept for the species of the Old World the same principles as for those of the New World, we are obliged to increase the number of Old World species ad infinitum, which is against all natural grouping. The slight although remarkably constant differences in the pubescence of the spikelets, is not only found in the American species but this constancy is observed also in the European varieties, a fact which is connected with the cleistogamic pollination of the genus *Vulpia*. To find an important character, fit for a general key to determine the *Vulpias*, we know that ASCHERSON and GRAEBNER accepted the length of the first glume for a classification, but in such a classification, the *Vulpia Myurus* gives us the greatest difficulties, because the species not rarely occurs with a very minute lower glume, although it is placed in the Synopsis in the group with longer first glumes. I have already called attention to this variety *subuniglumis* HACK., where the lower glume is so short that it reaches only one tenth of the length of the second one and is in this case scarcely 1 mm long.

The classification of the *Vulpias* is greatly hampered because there occur in this genus so often depauperate forms, which are the result of bad conditions during their growth and lack of nourishment. They grow often in sterile sands and on walls; depauperate specimens of *Vulpia Myurus* are scarcely distinguishable from the glabrous variety of *Festuca Danthonii*. American authors had in their own region, to deal with about 12 species only, the pubescent varieties inclusive; it can be calculated how many species we have to accept in the Old World if we follow the American method. As to the length of the first glume in the different species, I must call attention to the fact that the uppermost spikelets of the branches of the panicles have longer first glumes, a character which induced botanists to unite *Vulpia bromoides* and *Vulpia Myurus*, especially in those forms where the panicle of *Vulpia Myurus* is long exserted and not enclosed at the base in the uppermost sheath. Both species have moreover asperulous lemmas and we see therefore that the characters to distinguish them disappear more and more. Only the typical plants of both species are at once recognizable and for such specimens it is not difficult to prepare a key; for the many depauperate specimens, so often found, it is a hopeless task. For other species the proportions of the glumes are very constant. *Vulpia ligustica* and *Vulpia geniculata*, both with 3 stamens, can always be recognized, the former

by its very short lower glume, the latter by the long one. I collected a great many specimens of *Vulpia ligustica* and had never difficulties to distinguish them, even in the depauperate forms, from *Vulpia geniculata*. At the same time I never saw the up to 4 mm long anthers hanging from the spikelets, which can not be expected on account of the very short filaments. The anthers may protrude between the lemmas and paleas but they do not hang out as in other chasmogamic grasses. Although the *Vulpia* are divided into cleistogamic and chasmogamic ones, this character of chasmogamy is here essentially different from that of other chasmogamic grasses. The very short filaments of the stamens are a peculiar character for the genus *Vulpia* and the length of the anthers is a more accidental one and not so important as to make two different genera *Vulpia* and *Loretia*, as did DUVAL-JOUE.

Finally I will call attention to a recently published paper by F. HERMANN in the „Verhandlungen des Botanischen Vereins der Prov. Brandenburg“ Jahrg. 76 (1936). In this paper „Aus meinem botanischen Merkbuche VI“ the genus *Festuca* is treated and a synoptical key to the related genera is given. This key deals with the genera *Glyceria*, *Sphenopus*, *Sclerochloa*, *Cutandia*, *Desmazeria*, *Poa* and *Festuca*. The latter is divided into various so-called „Rotten“, which may be translated by „squads“. HERMANN's incorporations are not in accordance with taxonomical principles, because under his genus *Festuca*, the following 8 names, *Castellia* TINEO, *Micropyros* LINK, *Atropis* TRIN., *Vulpia* GMELIN, *Eufestuca* GRISEBACH, *Scleropoa* GRISEBACH, *Catapodium* LINK and *Nardurus* RCHB. are, according to the authors given behind the names, once more treated as genera (l. c. p. 28). *Vulpia* and *Cutandia* are discussed only, the former with the combinations as given under *Festuca*, the latter however with their combinations as valid under *Cutandia*; *Vulpia* is once more divided into 3 groups. We do not learn what rank they have. The three groups are named *Euvulpia*, *Ctenopsis* and *Pectinula*, the latter is proposed as new and based upon *Festuca pectinella* which is in reality the type of the genus *Ctenopsis* DENOT. Under *Vulpia* a new species was described by HERMANN as *Festuca marmaricae*; this species was already recognized by HACKEL and described by him in the year 1880 as a member of the section *Spirachne* of *Vulpia*, under the name of *Vulpia inops* (DÉL.) HACK., which is the same as *Vulpia brevis* BOISS. et REUT.. The whole treatment of this group of grasses by HERMANN is quite insufficient and incorrect for a good general view and proves that a great deal of the literature of this subject was neglected by him; his ideas are moreover based upon little knowledge of the whole tribe.

Summary.

In conclusion, we propose the following nomenclatural alterations. For a good classification, the genus *Vulpia* is to be accepted as a member of the *Festuceae*. Various names of *Vulpia* are fixed according to our present rules of nomenclature, viz. *V. bromoides* (L.) GRAY, *V. membranacea* (L.) LINK, *V. geniculata* (L.) LINK, *V. stipoides* (L.) DUM. and *V. Myurus* (L.) GMELIN. For *Vulpia ciliata* the earliest valid epithet is taken and so this widely distributed species must bear the name of *V. aetnensis* TINEO, while its glabrous variety is named *imberbis* (VIS.) HENR.. *Vulpia delicatula* (LAG.) DUM. var. *hirsuta* HENR. and *Vulpia geniculata* (L.) LINK var. *dasyantha* HENR. are described as new varieties. Among the South American species the new combinations *Vulpia eriolepis* (DESV.) HENR., *Vulpia australis* (NEES) HENR. and *Vulpia muralis* (KUNTH) HENR. are proposed, moreover the endemic *Vulpia Teneriffae* (ROTH) HENR. is mentioned. The North American species are treated in connection with the parallel variations of the European *Vulpias* and the following new combinations are given, viz. *Vulpia octoflora* (PIPER) RYDBERG, var. *hirtella* (PIPER) HENR., *V. sciurea* (NUTT.) HENR., *V. arida* (ELMER) HENR., *V. confusa* (PIPER) HENR., *V. Eastwoodae* (PIPER) HENR., *V. Grayi* (ABRAMS) HENR. and *V. Tracyi* (HITCHC.) HENR..

CONSERVATION OF LATER GENERIC HOMONYMS:

RHIPIDIUM CORNU VERSUS RHIPIDIUM AUCT.

by

W. J. LÜTJEHARMS (*Leiden*)

(Issued April 20th, 1937).

Many plants are as a whole or in some characteristic features flabelliform. So it is easy to understand that botanists often used the word $\xi\pi\iota\sigma$ or $\xi\pi\iota\delta\iota\sigma$ as a component of plant names. It is rather astonishing, however, that this word, *R(h)ipidion* or *R(h)ipidium* occurs no less than five times as a generic name (including one nomen nudum). In the list of homonyms by Miss M. L. GREEN c.s. (Kew Bull. misc. Inf., 1935, p. 341—544) the word is not mentioned, though it is of importance for mycologists. It may seem curious that also OTTO KUNTZE, who was very keen on such cases, probably overlooked it. Only in the list of nomina conservanda (auct. R. MAIRE; Int. Rules Nomencl., Ed. III, 1935, p. 124) one of the cases was considered¹).

Rhipidium CORNU, Bull. Soc. bot. Fr., 18, 1871, p. 58; Ann. Sci. nat. Bot., V, 15, 1872, p. 15. (*Saprolegniaceae*).

Standard species: *Rh. interruptum* CORNU l.c. = *Rh. continuum* CORNU l.c. = *Rh. europaeum* VON MINDEN, Krypt. Fl. Brandenburg, V, 1915, p. 597 (1912). For the argument of typification, see VON MINDEN, l.c., p. 596.

As this genus is generally accepted both by European and American mycologists, it needs conservation against the homonyms mentioned below.

Ripidium J. J. BERNHARDI, SCHRADER's Journal für die Botanik, II, 1800 (1801), p. 127, t. 2, f. 3, based on *R. dichotomum* (L.) BERNH. = *Schizaea dichotoma* (L.) J. E. SMITH, is a synonym of *Schizaea* J. E. SMITH.

¹) As Candollea VII (1936) was not yet available at the library of the Rijks-herbarium owing to the very retarded distribution by the official Exchangebureaus, I do not know if this case was treated in the list of Fern-homonyms on p. 137—139 of that volume.

Rhipidion TARG.-TOZZ., Cat. Veg. Marin. MS, p. 289; manuscript name, published by BERTOLONI, *Amoenitates italicae*, 1819, p. 312, as a synonym of *Fucus Flabellum* BERT. = *Flabellaria petiolata* (TURRA) TREVISAN¹). (*Codiaceae*).

Published as a synonym (*nomen nudum*) it needs no further comment. It was never used by algologists. As the printed Catalogue of G. TARGIONI-TOZZETTI (*Catalogus vegetabilium marinarum musei sui, Florentiae* 1826) is not available in any public library in Holland, I could not find out if perhaps the name *Rhipidion* was published validly in this work. This may be considered as a question of minor importance.

Ripidium TRIN., Fundam. Agrost., 1820, p. 169.

= *Erianthus* MICHAUX, Flora Bor.-Americ., I, 1803, p. 54. (*Gramineae*).

Rhipidium WALLR., Fl. Crypt. Germ., II, 1833, p. 742. (*Agaricales, Tricholomataceae*).

Based on *Rh. stipticum* WALLR. l. c. = *Agaricus stipticus* BULL., FRIES, S.M. I, 1821, p. 188.

This name is not likely to be revived as it was never used by mycologists. MAIRE (*Int. Rules Nomencl.*, Ed. III, 1935, p. 124) proposes to reject it against *Panus* FR. (type species: *P. torulosus* FR.). According to SINGER's emendation of *Panellus* KARST. (*Ann. Myc.*, 34, 1936, p. 334; *B. B. C.*, 56 B, 1936, p. 141—142) with the acception of *P. stipticus* (BULL. ex FR.) KARST. as a type species, I think it better to reject *Rhipidium* WALLR. in favour of *Panellus* KARST. (*Bidr. känned. Finl. Nat. och Folk*, 32, 1879, p. XIV, 96; em. Sing., l. c.) (type as indicated).

¹) According to ENDLICHER, *Gen. Plant.*, 1836—40, p. 9 (1836), *Rhipidion* TARG. is a synonym of *Zonaria* AG. a. *Padina* AD.

NOTES ON
CONVERGENCE AND IDENTITY IN RELATION
TO ENVIRONMENT.

by

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Any community of plants is characterized in four main ways — by a definite floristic composition, by definite life-forms, by a definite structure and by a definite habitat or environment.

Of these four characters, floristic composition is the most important in defining a plant community in any particular locality. It is a commonplace fact that many parts of the world may show communities of higher plants identical in life-form, structure and habitat but differing widely in their floristic composition. By utilising the three last named characters of a plant community we can group our unit biocoenoses into larger groups.

Life-form alone is sufficient to define the general types of vegetation which form great zones in different latitudes. Examples are the ever-green needle-leaved coniferous forest, the broad leaved deciduous forests, the hard-leaved sclerophyll scrubs, rain forests, grassland and steppe.

If we take structure and habitat into consideration as well as the life-form, it is possible to define smaller units of vegetation as for example sclerophyll forests and scrubs, savannah forests and so on. Although the floristic composition of these communities is different in different parts of the world, their physiognomy, their general make up and environment are similar. Examples for the sclerophyll scrubs are the maquis or macchia of the Mediterranean coasts, the chapparal of California, the espiñol of Chile and the scrubs of Southern Australia and South Africa. Similar savannah woodlands or forests occur in these same areas. Savannah woodlands dominated by *Quercus* and *Eucalyptus* in California and South Australia respectively, show this convergence in facies of communities in a similar environment, but with entirely different floristic compositions.

Even within a large continent such as Australia, the same vegetation type may show different floristic compositions in different localities.

An example is seen in the high sclerophyll forests of *Eucalyptus* in the Mount Lofty Ranges in South Australia and in the Blue Mountains in New South Wales. In both cases the soil is a podsol poor in mineral nutrients and both are characterized by well-marked alternating wet and dry periods. The facies is similar and the total number of species in the communities is approximately the same. The character plants of the areas belong to the same genera but to different, but closely allied, species. The following list gives the „abundant” plants in the two areas, but could also be extended to include the „occasional” and „rare” plants where a similar replacement of a species by one closely allied to it will be found.

Characteristic plants of Sclerophyll forests in New South Wales
and South Australia.

New South Wales.

Eucalyptus piperita
Persoonia salicina
Leptospermum flavescens
Banksia spinulosa
Hakea dactyloides
Isopogon anemonifolius
Dillwynia ericifolia
Acacia discolor
Pultenaea scabra
Phyllota phyllicoides
Lissanthe sapida
Tetratheca ericifolia
Epacris grandiflora

South Australia.

Eucalyptus obliqua
Persoonia juniperina
Leptospermum scoparium
Banksia marginata
Hakea ulicina
Isopogon ceratophyllus
Dillwynia ericifolia
Acacia myrtifolia
Pultenaea daphnoides
Phyllota pleurandroides
Lissanthe strigosa
Tetratheca pilosa
Epacris impressa

The same replacement of one species by another closely allied to it can be seen in scrubs on shallow soils or on laterite soils in the two areas and dominated by *Eucalyptus stricta* and *Casuarina distyla* respectively in New South Wales and by *Eucalyptus fasciculosa* and *Casuarina stricta* respectively in South Australia.

The difference in floristic make-up, but convergence in affinities is accounted for by the evolutionary history of the Australian flora. The genera of Eastern Australia are also found in Western Australia. Statistical analysis of the flora shows that the native Australian genera probably arose in the South Western portion of the continent and from this centrum a dispersal of species occurred to the east. In late Creta-

ceous times the eastern and western portions of Australia were virtually separated by a vast sea so that two centres were present in which endemic species could arise. When the Gulf Regions of South Australia were uplifted in Pleistocene times migration occurred from both these centres to give the present flora of South Australia. This isolation of the two parts of the continent accounts for the different floristic composition of similar vegetation types in similar environments in different parts of the continent and there is little doubt that were the flora of Australia more evenly distributed the floristic composition of the sclerophyll forests in different regions would show little variation.

Changes in floristic composition of a vegetation community, occur with changes in the habitat. The factors of the habitat can be grouped under three headings — climatic, soil and biotic factors. The first two are the more important and are not completely independent. With the higher plants, climate especially exerts a sifting effect upon the vegetation. In general, the more extreme the climatic environment becomes, the more specific becomes the plant community in equilibrium with the environment: from a community containing plants belonging to numerous families there is a change to one containing only a few species belonging to a few circumscribed families.

The mechanism of this sifting effect is clear. Owing to deep-seated metabolic changes or owing to structural changes brought about by changed metabolism, certain species in a migrating population of plants will have a better chance of surviving when entering a new environment than other species with less specialised mechanisms. Such plants are often said to be better „adapted” to their environment which does not mean that any change in the Lamarckian sense has occurred but simply that they have a greater survival value, a value which is probably intrinsic in its genetical make-up. They have been selected by the external milieu.

The sifting effect of climate may be seen in the mallee regions of South Australia. The mallee is really a vast ecotone connecting the sclerophyll communities of the south with the arid communities of the north. The terrain is even, the soil type constant throughout and the climate slowly changes from north to south, the chief difference being a range of mean annual rainfall from 20 inches to 8 inches. The only constant species are the mallee eucalypts, *Eucalyptus oleosa* and *E. dumosa*: the associated species slowly change as one progresses northwards until the numerous sclerophyll species of the south are replaced by the few Chenopodiaceae of the north. Finally the mallee eucalypts

themselves disappear and a chenopodiaceous shrub-steppe composed of *Atriplex*, *Kochia* and *Bassia* species forms the only vegetation of the plains. These genera, or others closely allied to them, are components of arid shrub-steppe in Northern Africa, in Central Asia and in Western America.

In the mallee the concentration of the soil solution increases with decreasing rainfall. The selective effect of climate is seen more clearly perhaps in the case of mangroves where the composition of the soil solution remains approximately constant but the aerial environment changes. In Northern Australia, mangroves belonging to various genera, but especially *Rhizophora*, *Ceriops*, *Bruguiera*, *Aegiceras*, *Avicennia* and *Sonneratia*, form extensive rain forests along the swampy coasts. As one progresses southwards and the humidity decreases various species drop out from the forest until near Sydney *Avicennia officinalis* and *Aegiceras majus* alone form a forest; whilst in South Australia *Avicennia officinalis* is the only member of the mangrove communities.

When the edaphic milieu becomes more extreme, and especially when the aerial milieu remains approximately constant, the selective effect becomes even more marked; and in a given milieu the same families and frequently the same genera are to be found as components of the biocoenose in all parts of the world. Two examples will serve to illustrate this convergence of floristic units, when the milieu becomes extreme; one is the halophytic vegetation of salt lakes and marshes and the other that of peat bogs and moors.

In South and Central Australia precisely the same species of plants are found in definite zones corresponding to the salt concentration in both coastal swamps and far inland salt lakes. To illustrate the convergence of species we give lists of the character plants in three zones around salt lakes in three regions, one from South Australia, one from the Great Salt Lake at Utah and one from the Caspian Sea. The prominent plants are restricted to a few genera of the Chenopodiaceae.

<i>South Australia</i> (13)	<i>Utah</i> (5)	<i>Caspian Sea</i> (10)
1. <i>Arthrocnemum</i> <i>arbuscula</i> <i>Salicornia australis</i>	1. <i>Salicornia rubra</i> <i>Salicornia utahensis</i>	1. <i>Haloenemum strobilaceum</i> <i>Salicornia herbacea</i>
2. <i>Arthrocnemum</i> <i>haloenemoides</i> <i>Suaeda australis</i> <i>Kochia oppositifolia</i>	2. <i>Allenrolfia occidentalis</i> <i>Suaeda erecta</i> <i>Suaeda Moquinii</i>	2. <i>Petrosimonia crassifolia</i> <i>Suaeda maritima</i>

<i>South Australia</i> (13)	<i>Utah</i> (5)	<i>Caspian Sea</i> (10)
3. <i>Distichlis spicata</i>	3. <i>Distichlis spicata</i>	3. <i>Atriplex verruciferum</i>
<i>Atriplex paludosum</i>	<i>Atriplex hastata</i>	<i>Atriplex canum</i>
<i>Sporobolus virginicus</i>		<i>Anabasis salsa</i>

In high moor bogs the convergence of the flora is equally striking. The most characteristic feature of these bogs is their oligotrophic character, that is, their dearth in mineral substances and their high hydrogen-ion concentration (pH usually about 4.0 to 4.5). We give examples of the typical flora of two such bogs which agree in the above characteristics; but in one the peat is a sphagnum-peat, in the other a sedge-peat. The former is in Drenthe, Holland, the latter at Mt. Compass in South Australia. The flora of the peaty heaths in Drenthe is similar in all respects to that of oligotrophic heaths, described by KOPPE (11) for Northern Europe and by KATZ (9) for Western Siberia.

Drenthe.	Mt. Compass.
1. <i>Rhynchosporium albae</i>	1. <i>Chorizandretum enodis</i> .
<i>Rhynchospora alba</i>	<i>Chorizandra enodis</i> (peat former)
<i>Batrachospermum vagum</i>	<i>Batrachospermum moniliforme</i>
<i>Drosera intermedia</i>	<i>Drosera pygmaea</i>
<i>Lycopodium inundatum</i>	<i>Lycopodium carolinianum</i>
<i>Utricularia minor</i>	<i>Utricularia lateriflora</i>
<i>Eriophorum angustifolium</i>	<i>Selaginella Preissiana</i>
<i>Sphagnum recurvum</i> } peat-	<i>Microtis atrata</i>
<i>S. cuspidatum</i> } formers	<i>Levenhookia dubia</i>
2. <i>Sphagnetum medii</i> .	2. <i>Cladictum juncii</i> .
<i>Vaccinium oxycoccus</i>	<i>Sprengelia incarnata</i>
<i>Andromeda polifolia</i>	<i>Drosera binata</i>
<i>Drosera rotundifolia</i>	
<i>Empetrum nigrum</i>	
<i>Eriophorum vaginatum</i>	
<i>Euphrasia nemorosa</i>	<i>Euphrasia Brownii</i>
<i>Orchis maculata</i>	<i>Diuris palustris</i>
	<i>Microtis porrifolia</i>
<i>Lycopodium clavatum</i>	<i>Lycopodium laterale</i>
<i>Pilularia globifera</i>	<i>Schizaea fistulosa</i>
	<i>Lindsaya linearis</i>

Drenthe.

Blechnum Spicant
 Sphagnum medium
 S. rubellum
 S. acutifolium
 S. molluscum
 S. recurvum
 Polytrichum commune
 P. strictum
 Hypnum sp.

peat-
formers

Mt. Compass.

Blechnum discolor
 Cladium junceum
 Schoenus brevifolius
 Hypolaena laterifolia
 H. fastigiata
 Leptocarpus tenax
 Lepidobolus drapetocoleus
 Polytrichum juniperinum
 Hypnum sp.

3. *Ericetum Tetralicis*.

Erica Tetralix
 Calluna vulgaris
 Molinia coerulea
 Juncus squarrosus
 Scirpus caespitosus
 Carex panicea
 Sphagnum compactum

3. *Epacridetum impressae*.

Epacris impressa
 Leptospermum scoparium
 Lepidosperma exaltatum
 Cladium glomeratum
 Cladium tetragonum

In these peats the convergence of the flora owing to the selectivity of the milieu is more striking than that of the salt lakes for the flora is richer. Neglecting the peat-forming elements, the same genera in approximating equal numbers are common to both these widely separated localities.

Aqueous milieu is, in many respects, more homogeneous. The transpiration factor and its deep consequences upon metabolism is excluded. Even if the aqueous milieu changes in „climate” as well as in composition, its homogeneity allows us to characterize it with greater certainty than a subaerial milieu. Peatwater, freshwater and seawater show a number of biocoenoses which would allow of very interesting parallels in the sense given in the „terrestrial” examples. However, this would prove a veritable „mer à boire” and we shall, therefore, pass to slightly more selective environments. Evaporating seawater or inland-water might reach a certain concentration at which the fresh-water or the marine components markedly decrease in importance, because either the limits of their physical and chemical milieu or the limits of their biotic milieu are reached (e.g. competition). The most striking instance of this biocoenosis we find in the so-called „condensor” stage of solar evaporation of seawater, where the concentration increases from 3.5—

$\pm 12\%$ total salts, concomittant with the deposition of calcium carbonate. Apart from local (chiefly faunistic) elements this community proves to be similar all over the world. The leading form is here *Ruppia maritima* L.. Although the cosmopolitan nature of this form was recognized by ENGLER (3) as early as 1874, BRAUN BLANQUET mentions its occurrence „in the northern hemisphere” (2). SETCHELL (15) remarks that it occurs „to some extent, at least, even in the southern hemisphere”. ASCHERSON (1) discusses its cosmopolitan nature in relation to a possible common origin of the present land masses!

Without embarking upon a discussion of the origin of this distribution, and without considering the modes of dispersal (GRAEBNER, 6), we have to accept the fact that the „*Ruppion maritimae*” is a cosmopolitan association. In view of the apparent differences of opinion it may be well to illustrate this by mentioning a few localities represented in the beautiful collection of *Ruppia* in the Rijksherbarium, Leiden, which were kindly put at our disposal by its Director. If we add to these a few localities cited from the literature we obtain the following picture. The plant occurs throughout Europe, North America, the West Indies, the Caribbean coasts, the Northern and Eastern coasts of Africa, British India, Java, Madoera, the Philippines, China, Japan, Korea, Australia and Tasmania.

From the preliminary experiments of SETCHELL (15) it seems to follow that *Ruppia* is unable to withstand extreme conditions of temperature and salinity: SETCHELL gives $15\text{--}20^{\circ}\text{C}$. for germination and seedling-development, $20\text{--}25^{\circ}\text{C}$. for vegetative growth and reproductive activity; salinity $0.68\text{--}4.59\%$. It is obvious, however, that the range of salinity and of temperature for *Ruppia* is greater than these limits. One of us was able to observe the Ruppion near Setubal, Portugal; near Dadar, Bombay Presidency; on the island of Madoera, Dutch East Indies; and in the Bay of St. Vincent, Port Price, South Australia. In Portugal a large form (var. *longipes* HAGSTRÖM?) was observed early in September in water containing 7% solids at a temperature of 28°C . A small variety corresponding to var. *rostellata* KOCH, was observed in fruit in the condensor ditches at Dadar (Bombay Presidency) during February 1936. Here the salinity varied between 7 and 11% ! In Madoera, the plants, corresponding to the var. *spiralis* KOCH were in apparently healthy condition, covering vast stretches of subaquatic meadow at a salinity of 6% and at a temperature around 30°C . At the Ruppion of Pt. Price, South Australia, the salinity varied between $6\text{--}7\%$!

The gypsum lakes of Yorke Peninsula when visited by one of us in March 1936, only contained saturated brine and salt-crusts. Still, LOCKHART JACK (8) mentions the occurrence of „salt-weed” in the wet season which disappears at higher concentration. The dried and salt-incrusted stalks, found by us at e.g. Fowler and Black-Hill lakes undoubtedly belonged to *Ruppia*!

From the above it appears that *Ruppia* is cosmopolitan, that its temperature-range extends well beyond 25° C. (where SETCHELL found, for the races studied by him, a deficient anthesis) and that, furthermore, the salinity tolerated might be higher than 10 % total salts. In these respects *Ruppia* appears to be unique; competition with other Phanerogams (even *Zostera*) is excluded and therefore it appears wherever this particular environmental „niche” is given on this planet. The faunistic elements of the *Ruppion* vary e.g. Molluscs: in S. Australia and Tasmania we find *Coxiella badgerensis* and *Hydrobia* spec.; from Ehrenberg's *Ruppia* material collected near El Tor, Red Sea in 1825 we extracted a shell of *Potamides* sp. while in Holland the Molluscs of the *Ruppion* are species of *Hydrobia* — *H. stagnalis* and *H. ulvae*; but the floristic elements seem to be more specific. These are *Enteromorpha* and *Chaetomorpha* from the greens, from the Diatoms e.g. *Amphora coffaeiformis* and *Navicula haliphila*, from the bluegreens two or three species of *Spirulina* and especially the mat-forming cosmopolitan *Microcoleus chthonoplastes* THUR. From our own collections as well as from the material of the Rijksherbarium, Leiden we obtained the following list of localities for the latter: Europe, North America, North and East coast of Africa, British India, Samoa, Dutch East Indies, Australia. As other elements we may mention the curious *Eutreptia viridis* PERTY, var. *Schizochlora* ENTZ, found in Siebenburgen by ENTZ, and appearing again in California and Setubal!

The „*Ruppion maritimae*”, while cosmopolitan and, as far as its floristic elements are concerned, rigidly specific still shows, in its faunistic components certain regional (i.e. non-cosmopolitan) traits. Apparently even at salinities of 10 % the milieu is not yet sufficiently specific to determine all components unambiguously.

A milieu both sufficiently extreme (exceeding the general potentialities of most organisms) and specific (exceeding the specific potentialities of most organisms) may be found in hot springs, in excessively alkaline or acid lakes and also in saturated brines. The second author has been carrying out a comprehensive study of these brines from various localities all over the world and from this study it

appears that this biocoenosis is identical whether the brines are studied in North America, South America, Australia, Asia or Europe. The characteristic organism here appears to be a green polyblepharid flagellate, *Dunaliella viridis* TEODORESCO and the community may be designated as a „Dunaliellon“. Drawing only from personal experience, the occurrence of this community was observed in Argentine, Brazil, Venezuela, West Indies, California, Nevada, Utah, Portugal, Italy, Roumania, Hungary, Crimea, Palestine, Egypt, Tunis, Algiers, Djibouti, South Africa, Java, Madoera, Gobi-desert, Hawaii, South Australia, Victoria.

This Dunaliellon is further characterized by the occurrence of another polyblepharid flagellate, *Asteromonas gracilis* ARTARI (Crimea, Portugal, California, Brazil), by a bluegreen, *Aphanocapsa salina* FRÉMY and by a group of colourless flagellates, originally described by NAMYSLOWSKY (12) and ENTZ (4). Curious salt-loving bacteria (e. g. *Micrococcus morrhuae* KLEBAHN) and Fungi (*Oospora halophila* v. BEYMA THOE KINGMA) occur also. The selective factor is, in this case, the salt-concentration.

When, for a certain organism other factors (alkalinity, ionic proportions, temperature) may be limiting but not NaCl-concentration as such, we observe, even in concentrated brines, a group of real „die-hards“, the most eurytopic organisms but which, like Achilles, have their vulnerable spot — namely in the rare cases where the terrestrial milieu exceeds their potentialities. Having progressed, in the course of this discussion from the general to the specific we are faced, at this point with the most „general“ organisms! *Polytoma uvella*, a colourless biflagellate occurs in freshwater and in salt, in cold water and in hot springs at 42° C. Species of *Amoeba* occur in concentrated brine, in freshwater and in saline hot springs. Bluegreens of the genus *Phormidium* perform the same feat, and also purple and thiobacteria. Special mention should be made here of the bacteria capable of decomposing cellulose and sulphate anaerobically, for there is no natural solution without them. A large number of *Ciliates* and *Flagellates* and even *Nematodes* and *Flies* are apparently equally unlimited in their potentialities and, therefore, in their distribution. Possibility of universal dispersal is a reality for the majority of living things.

In this case the selective milieu, picking out from the mass of latent life those that show „resonance“, those that are awakened to active development, is all-important. From organisms with a more limited capacity for dispersal the milieu selects as well. The available mass of

organisms is herded into the various biocoenoses. Any new evolutionary unit, whether a mutation or a true-breeding hybrid is weighed by the environmental complex and is found fit or may be found wanting.

It has been most refreshing to us to consider convergence and identity in its relation to dispersal and external environment in this simple Darwinian way. While aware of many partly conflicting theories on this subject, we feel that in the main our trail has been that of the man who sailed in the „Beagle” more than a century ago.

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VELLOZIACEAE AMERICANAE NONNULLAE NOVAE VEL MINUS COGNITAE

auctore

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(Issued April 20th, 1937).

Barbacenia Blanchetii GOETH. et HENR. nov. spec. — Caudex brevissimus, simplex vel divisus, squamis adpressis dense tectus ad $1\frac{1}{2}$ cm crassus. Folia laete viridia, dense conferta, numerosa, exteriora saepius pauca reflexa, siccitate contorta, interiora gradatim magis erecta, omnia linearia, acuta, subulata, utrinque striatula, breviter sparse subadpresse pilosa, subtus in nervo mediano paullum prominente leviter carinata et in margine dense breviuscule pilosa, basin marginis versus longe albo-ciliata, circ. 10—12 cm longa, 1 cm lata. Flores ad 1—3 per rosulam, subterminales, violacei. Scapus foliis fere duplo brevior, subtrigonus, dense pilosus, pilis longis tenuibus subflexuosis divergentibus. Perigonii tubus elongato-clavatus, multicostatus, 3—4 cm longus, fauce circ. 6 mm amplius, fere $\frac{1}{2}$ parte ovario vix incrassato, clavato vel clavato-oblongo, pilis longiusculis subadpressis glanduliferis densiuscule vestito, adnatus, superne breviter parce pilosus. Tepala erecta vel erecto-potentia, longitudine fere ovarii, lineari-lanceolata, circ. 2 cm longa, 4 mm lata; 3 exteriora paullum angustiora, acutiuscula, extus breviter pilosa; 3 interiora glabra, obtusa, breviter mucronulata. Stamina tepala fere aequantia. Filamenta subcoriacea, longa, linearia, apicem versus breviter bifida, gradatim attenuata, ad 14 mm longa, $2\frac{1}{2}$ mm lata, prope apicem antheram linearem, filamentum aequilongam dorsifixam filamentum $\frac{3}{4}$ partibus superantem gerentia. Stylus filiformis, trigonus, parte stigmatifera fere globosa, paullum incrassata, tepala aequans. Capsula ellipsoidea, circ. 18-costata, breviuscule subadpresse pilosa.

Brasilia: prov. Bahia. leg. BLANCHET. no. 3278! (Herb. Mus. Berol., Herb. Mus. Vindeb., Herb. Delessert); BLANCHET 3273! „Igreja Velha” fl. violettes” (Hb. DC.); BLANCHET 2537! La Jacobina (Hb. DC., Hb. Mus. Paris); 3870 — Pongo d’Areia (Herb. Mus. Paris, Herb. Delessert).

Imag. fotogr. Herb. Lugd. Bat. no. 131, 132, 120.

Barbacenia brachycalyx GOETH. et HENR. nov. spec. — Stirps glaberrima. Caudex brevissimus, simplex, ad $2\frac{1}{2}$ cm crassus, squamis erecto-patentibus, plus minusve fissis tectus. Folia subrosulata; interiora ad 6—8 erecta; exteriora numerosa, reflexa, mox marcescentia, persistentia; omnia lanceolata, subulato-acuminata, acumine complicato, ad 11 cm longa, 1 cm lata, plana tenera, glauca, subincrassato-marginata, nervo mediano subtus prominente, leviter carinata, in marginis carinaeque parte superiore minute, inferne remotiuscule, apicem versus densissime serratim denticulata. Flores solitarii subterminales, rubro-purpurei. Scapus foliis sesquilingior, erectus, subflexuosus, striatus (trigonus?). Perigonii tubus totus fere ovario obsolete clavato circ. 18-costato, adnatus, fauce ampliatus, usque ad 10 mm longus, 3 mm crassus. Tepala ad 25 mm longa, erecta; 3 exteriora spathulato-oblonga, subunguiculata, breviter acuminata, parallelinervia, ad 6 mm lata; 3 interiora oblonga, ad 8 mm lata, obtusa, breviter mucronato-acuminata, margine lata oblique venosa. Filamenta subcoriacea, ad 11 mm longa, usque paullum supra medium in tubum cylindricum connata, partibus liberis late linearibus, apice rotundatis, prope apicem antheras lineares, circ. 10 mm longas fere basifixas gerentia. Stylus elongatus, filiformis, subtrigonus, tepala aequans vel paullum superans, parte stigmatifera incrassata ovoideo-trigona, stigmatibus oblongis. Capsula ignota.

Brasilia: prov. Goyaz. leg. GLAZIOU no. 22207. „Pichoa au Morro do Espigao, sur les rochers, 5 oct. 1894. Fleur rouge pourpre”. Typus in H.L.B. sub no. 912.180—581.

Imago fotogr.: Herb. Lugd. Bat. no. 138.

Barbacenia caricina GOETH. et HENR. nov. spec. — Caudices (e rhizomate oriundi?) numerosi, elongati, erecti vel adscendentes, simplices vel saepius furcati, graciles, usque ad 30 cm longi, 3 mm crassi, squamis arete adpressis, sulcatis, ecarinatis quarum apices grisei, partes basales fusco-purpurascens, tecti et fere omnino foliis emarcidis, refractis velati. Folia trifaria; superposita 5—10 mm distantia; juniora pauca erecta et erecto-patentia; adulta circ. 20, horizontalia; omnia anguste lineari-triangularia, 70—80 mm longa, $2\frac{1}{2}$ mm lata, glabra, canaliculata, nervo mediano subtus prominente rotundato-carinata, carina praeter partem basalem aculeolis rarioribus, acutis, inferne saepe binatis scabra; margine densiuscule aculeolata, aculeolis inferne saepe binatis et recurvatis, apicem versus irregulariter serratim dispositis. Characteres florum imperfecte cogniti; (e flore unico emarcido). Ovarium costatum. Perigonii tubus supra ovarium paullum productus. Tepala lineari-lanceolata,

(erecto-patentia?), rubra (fide BINOT). Stamina tepalis multo breviora. Filamenta late linearia, binervia, apice bifida, incisione angustissima, laciniis late rotundatis, toto filamento 4—5-plo brevioribus. Antherae filamenta aequantes, prope basin filamenti affixae. Stylus stamina circ. aequans, parte stigmatifera longissima ad basin modice incrassata, triquetra, apicem versus sensim attenuata. Capsula oblonga, trigona, 12-costata, 15 mm longa, 7 mm lata, item ac pedunculus validus, subterminalis, folia multo superans glaberrima.

Brasilia: Rio Janeiro: GLAZIOU no. 12222. „Nova Friburgo a la Pedra do Conego, le 23 Juin 1880.” (sine fructificatione). Typus in H. L. B. sub no. 912.180—559. In specimine vivo a cl. BINOT in Brasilia lecto et in hortum botanicum Lugduno-Batavum invento, capsulas et flores emarecidos inspicere potui. Nomen inditum propter innovationes, *Caricum complurium* similis.

Imago photographica Herb. Lugd. Bat. no. 158.

Barbacenia conicostigma GOETH. et HENR. nov. spec. — Acaulis v. caulescens (fide RIEDEL). Folia lanceolata, exteriora probabiliter reflexa, in apicem filiformem angustata, glabra, striata, basi resinosa carina dorso rotundato, glabra, margine in tertia parte superiore breviter, in parte inferiore longe ciliata, pilis longioribus rigidiusculis flavo-fuscis erecto-patentibus, pilis brevioribus intermixtis. Rosulae in specimine unico viso 3-florae. Scapi folia superantes erecti dense glandulosi, pilis glanduliferis crassis patentibus, subtortuosis et pilis glanduliferis multo brevioribus, angustioribusque patentibus, rectis. Flores coccinei. Ovarium subtrigono-ellipsoideum dene glanduloso-pilosum, pili glandulosi patentissimi bifformes, scilicet longiores robustiores subcurvati, pilis multo brevioribus rectis intermixtis. Perigonii tubus cylindricus, ovario parum angustior, pilis glanduliferis iis ovarii similibus, sparsis, praeditus, ovario 3-plo longior, limbus in laciniis sex lineari-lanceolatis, erecto-patentibus (post anthesin recurvatis?) tubo $\frac{1}{3}$ brevioribus divisus; lacinae 3 exteriores parum longiores, acutae, dorso densiuscule glandulosae; 3 interiores obtiusculae, breviter acuminatae, glabrae. Stamina filamentis deplanatis apice bifidis, laciniis erectis angustis acutissimis, filamento duplo brevioribus, fere in bifurcatione antheras gerentibus. Antherae lineares, tepalis fere aequantes, basin filamenti haud attingentes, apicem laciniarum $\frac{1}{2}$ filamenti longitudine superantes, post anthesin extrorsum circinantes. Stylus apicem filamentorum laciniarum attingens, in parte superiore filamentorum longitudine parum incrassata, subuliformi, stigmata 3 lateralialia, lineari-spathulata gerens.

Brasilía: Specimen unicum incompletum in Herb. Leningrad asservatur „Acaulis et caulescens. Flor. coccinei. In saxosis monti alti. Serra da Lapa”. RIEDEL anno 1824.

Imago fotogr.: Herb. Lugd. Bat. no. 115.

Barbacenia curviflora GOETH. et HENR. nov. spec. — Caudex brevis, erectus, ad 4—5 cm longus, circ. 1½ cm crassus. Folia numerosa, spiraliter conferta, erecta usque ad patentia; exteriora incurvata; omnia linearia, acuminata, striata, in sicco marginibus revolutis, usque ad 25 cm longa, 8 mm lata, in vaginam adpressam, amplexantem, stramineam, sulcatam, late membranaceo-marginatam dilatata; nervo mediano, subtus valde prominente, squamulis subadpressis, acutiusculis, basin versus saepius binatis, remotiusculis serrato, acute carinata; supra albicantia, resinosa, squamulis numerosis, latis, brevissimis, superne integris, basin versus denticulatis, ima basi in pilos deplanatos, acutos, subadpressos, excurrentibus transverse zonata et margine squamulato-serrata basin versus ciliata; subtus (in sicco) sordide fusco-viridia. Flores 2—3 subterminales, rubro-violacei. Scapi erecti vel flexuosi, foliis breviores, trigoni, sulcati, fere in tertia parte superiore pilis paleaceis, linearibus, longiusculis, rubescentibus, glandulis parvis terminatis densiuscule vestiti. Perigonii tubus elongatus, curvatus, costatus, cylindricus, apicem versus vix ampliatus, ad 4—5 cm longus, 3 mm amplus, fere tertia parte ovario clavato, leviter curvato, adnatus, cum tepalorum exteriorum dorso pilis deplanatis, glanduliferis, aequae ac in seapo occurrentibus, supra ovarium sensim decrescentibus, densiuscule vestitus. Tepala erecta, lingulato-linearia, obtusa, mucronulata, circ. 20 mm longa, 2 mm lata. Stamina tepalis fere duplo breviora. Filamenta plana, e basi lata in apicem 1 mm latum, angustata, lateribus concavis, circ. 4 mm longa, apice incisione late triangulari bifida, laciniis brevibus obtiusculis. Antherae infra incisionem affixae, basin filamenti vix attingentes, apicem ¾ partibus excedentes, ad 13 mm longae. Stylus filiformis, tepala aequans vel paullum superans, parte stigmatifera modice incrassata, oblonga.

Brasilía: prov. Minas Geraes. GLAZIOU no. 19923. „Rio dos Pedros au Valu dans le terrain pierreux (Minas) 2 Mai. Fleurs rouge-violetées.” (Herb. Mus. Bot. Berol.)

Imago fotogr.: Herb. Lugd. Bat. no. 123.

Barbacenia cuspidata GOETH. et HENR. nov. spec. — Caudex brevis, crassus, bifurcatus, squamis griseo-fuscis, fissis, adpressis spiraliter dispositis dense vestitus. Folia numerosa, subrosulata, erecto et erecto-

patentia, nonnulla exteriora horizontalia, emarcida reflexa, caudice adpressa; omnia anguste linearia, longe cuspidata, apice filiformi, tenera, glabra, striatula, integra, basin versus anguste scarioso-marginata, 16 cm longa, 4 mm lata. Flores in apice ramorum solitarii, pseudoterminales. Pedunculi erecti, folia superantes, ad 20 cm longi, filiformes, subtrigoni, sulcati, densiuscule pilis longiusculis, patentibus, subflexuosis, in glandulas parvas terminatis, pilis multo minoribus intermixtis, obsiti. Perigonii tubus costatus, $\frac{1}{5}$ — $\frac{1}{4}$ parte ovario oblongo adnatus, supra ovarium angustatus et deinde ampliatus, elongato-infundibuliformis, pilis glanduliferis, ut in scapo occurrent, in parte ovariali crebris, faucem versus rarioribus. Ovarium circ. 10 mm longum, 4—5 mm crassum; tubus perigonii circ. 45 mm longus, supra ovarium 2 mm, ad faucem 8 mm amplius. Tepala ovario sublongiora, late linearia circ. 12 mm longa, 4,5 mm lata, apice late rotundata, mucronulata, omnia aequilongia, parallelinervia; exteriora secus nervum medianum parce glanduloso-pilosa. Stamina $\frac{2}{3}$ tepalorum longa. Filamenta supra basin dilatata angustata, deinde oblonga circ. 4,5 mm longa, usque a medio fere bifida, laciniis anguste triangularibus, acutis, subparallelis prope incisionem antheram 12 mm longam et basin et apicem filamenti longe excedentem gerentia. Stylus filiformis, parte stigmatifera oblongo-globosa, stamina vix superans. Cetera ignota.

Brasilia: probab. prov. Minas Geraes. Specimen unicum inter specimina *B. longiflorae* MART. a cl. GLAZIOU sub no. 19927 lecta, inveni (Hb. Paris).

Imago fotogr.: Herb. Lugd. Bat. no. 135.

Barbacenia flavida GOETH. et HENR. nov. spec. — Caudex brevissimus, erectus, circ. 5 cm longus, $1\frac{1}{2}$ cm crassus, foliis emarcidis, reflexo-patentibus, numerosis velatus. Folia spiraliter disposita, conferta; vivencia 6—8 erecta usque ad horizontalia; late linearia longe cuspidato-attenuata, nervo mediano subtus prominente tenuiter carinata, in sicco margine plus minusve revoluta, glabra, striata, viridi-flava, margine carinae aculeolis remotis subadpressis praedita, mox glabrescentia, circ. 20 cm longa, 9—11 mm lata. Scapus solitarius, gracilior, erectus, flexuosus, apice curvatus, subtrigonus, striatus, superne parce verruculoso-scaber, infra florem obliquum v. horizontalem densiuscule breviter stipitato-glandulosus. Perigonii tubus cylindricus basi rotundatus, ad 15 mm longus, $4\frac{1}{2}$ mm crassus; partibus 4 ovario 15—18-costato, in costis leviter verruculoso adnatus. Tepala circ. 20 mm longa, erecto-patentia; 3 exteriora lanceolata, acuta, submucronulata, parallelinervia, ad 5 mm lata; 3 inte-

riora oblonga ad 7—8 mm lata, obtusa, submucronulata, in parte marginali oblique venosa. Filamenta membranacea, e basi lata oblonga nervis duobus apice fureatis perducta, rotundato-truncata, ad 8 mm longa, 5 mm lata, apice bifida, incisione angustissima, laciniis circ. 2—2½ mm longis, leviter emarginatis, ima basi antheram fere basifixam, filamento aequilongam gerentia. Stylus trigonus ad 8 mm longus, incisionem filamentorum attingens; parte stigmatifera vix incrassata conico-triquetra, circ. 4—6 mm longa. Cetera ignota.

Brasilia: Prov. Minas Geraes. leg. A. DE ST. HILAIRE. Catal. D. N. 505. (Mus. Paris); Dep. Goyaz, Pichoa au Morro do Espigao. Sur les rochers. Fleurs rouges. 5 octobre 1894, leg. GLAZIOU no. 22207bis. Typus in H. L. B. sub no. 937.79—23.

Imago photogr. in Herb. Lugd. Bat. no. 139.

Barbacenia foliosa GOETH. et HENR. nov. spec. — Caudex subtrigonus, circ. 10 mm crassus, longitudine ignota. Folia trifaria, superposita, circ. 8 mm distantia, viventia pauca, erecto-patentia; emarcida numerosa, refracta, caudicem velantia, omnia linearia, apicem versus longe angustata, acutissima, usque ad 24 cm longa, 8 mm lata, plana vel leviter canaliculata, striata, glabra, nervo mediano subtus prominente anguste acutiuscule carinata, margine carinae denticulis acutis, prorsum spectantibus, valde remotis, in foliis vetustioribus saepissime glabrescentibus; vaginae brunneae, sulcatae, arete adpressae et resina propria conglutinatae. Scapus ad 15 cm longus, solitarius, subterminalis, (subtrigonus?), inferne glaber, superne glandulis nonnullis breviter stipitatis praeditus, apice densiuscule verrucoso-glandulosus. Tubus perigonii circ. 15 mm longus, 1 mm crassus, trigono-prismaticus, apice vix ampliatus, tribus partibus ovario adnatus, 12-costatus; costae 3 in aciebus ovarii remotiuscule stipitato-glandulosae; costae intermediae glabrae vel basin versus parce minuteque verrucosae. Tepala erecto-patentia, ovato-lanceolata, glabra; 3 exteriora longiora et angustiora, 25 mm longa, 4—5 mm lata, longe acuminata, parallelinervia, nervo mediano valido perducta; 3 interiora, 20 mm longa, circ. 7 mm lata, acutiuscula, margine angusta oblique-venosa. Filamenta late linearia, binervia, apice bifida, laciniis brevibus, rotundatis, 7—8 mm longa, 2½ mm lata, 3 exteriora paullo longiora, prope basin antheram fere basifixam, filamento 1¼-plo longiorem gerentia. Stylus stamina aequans, parte stigmatifera vix incrassata, subulata, stigmata (infra apicem oblonga?) ferens. Capsula ignota.

Descriptio e specimine unico in Herb. Mus. Bot. Berol. asservato.

Brasilia: Rio de Janeiro: E. Ule Herb. Brasil. no. 4056. „An Felsen der Tijuca, Rio de Janeiro. November 1894”.

Observ. A. *B. squamata*, HOOK. FIL. diversa: caudice dense foliato, forma ovarii tepalorumque, filamentis multo longioribus.

Imago photogr.: Herb. Lugd. Bat. no. 153.

Barbacenia fragrans GOETH. et HENR. nov. spec. — Caudex usque ad 50 cm longus, 1—2 cm crassus, erectus vel curvatus, dichotomus, rudimentis foliorum obliteratorum totus tectus. Folia spiraliter disposita, remotiuscula, numerosa, vivencia erecta usque ad patentia, inferiora magis, superiora minus curvata; emarceida reflexa, omnia linearia, longe acuminata, plana, striata, tenuiter carinata, utrinque densiuscule breviter glanduloso-pilosa vel fere glabra, margine carinaeque densius pilosa, 14—30 cm longa, 7—13 mm lata. Scapi 1—2, subterminales, graciles, teretiusculi, pilis breviusculis tenuibus, hyalinis in glandulas parvas terminatis vestiti. Perigonii tubus trigono-cylindricus, sordide rubescens, in sicco 4 cm longus, 5 mm latus, sec. cl. Mosèn in vivo 7—8 mm latus, $\frac{1}{2}$ parte inferiora modice inflatus, evidenter costatus, densiuscule breviter glanduloso-pilosus, ovarium plus quam duplo longior. Tepala in anthesi erecto-patentia, lanceolata, acutiuscula, basin versus paullum angustata, 3—3 $\frac{1}{2}$ cm longa, circ. 7 mm lata, parallelinervia nervo mediano extus prominente; 3 exteriora nervo mediano porrecto breviter mucronulata, extus breviter glanduloso-pilosa; 3 interiora fere glabra; omnia intus glabra, purpurascentia. Glandulae perigonii odorem Pelargoniorum exhalent. Filamenta linearia circ. 6 mm longa, 1 mm lata, basin versus paullum dilatata, apice in lacinias duas, breves, obtusas, fissa, prope apicem antheram dorsifixam, medium filamentum fere attingentem, apicem plus quam duplo superantem circ. 12 mm longam, gerentia. Stylus filiformis, parte stigmatifera incrassata, ovoidea, stamina superans. Cetera ignota. Characteres essentialia plurimi a cl. Mosèn e vivo observati in schedula plantae ab illo lectae optime indicati sunt.

Brasilia: prov. Minas Geraes et S. Paulo. HJ. Mosèn. Herb. Brasil. Regnelli no. 4444 (typus); „Caldas, supra rupes apricas interdum madidas in fissuris rupium” 1 fevr. 1876. WIDGREN sine no. in Herb. Brasil. Regnell. Mus. bot. Stockholm. no. III 1239; Caldas inter Gerivas et Engenho de Serra inter Saxa. leg. A. F. REGNELL; Commissao geogr. e geolog. de S. Paulo, no. 2198. Fazenda Santa Cecilia S. J. da Boa Vista. Typus in Mus. Bot. Stockholm.

Imago photogr.: Herb. Lugd. Bat. no. 133.

Barbacenia fulva GOETH. et HENR. nov. spec. — Caudex (versimiliter brevis) subincrassatus, foliis emarceidis reflexis velatus. Folia numerosa

(ad 12), conferta, erecta et erecto-patentia, emarcescentia reflexa; omnia linearia, a medio fere sensim angustata, cuspidata, striata, glabra, in margine et in carina modice prominente rotundata, breviter denseque ciliata, circ. 35 cm longa, 7—8 mm lata. Flos solitarius. Scapus foliis multo brevior, validus, trigonus, sulcatus, dense fulvo-hirtus, pilis patentibus, subuliformibus, subtortuosis; inferne breviter, superne gradatim longiter pilosus. Perigonii tubus coriaceus fere cylindricus, circ. 25 mm longus, basi rotundato-attenuatus, apicem versus vix ampliatus, circ. $\frac{3}{4}$ partibus ovario adnatus, totus pilis aequae ac in scapo occurrunt sed longioribus subadpressisque vestitus. Tepala erecto-patentia, tubo fere duplo longiora, lanceolata; 3 exteriora subangustiora, acuta, nervo mediano crasso, prominente excurrente, breviter mucronulata, dorso praecipue basin versus et in mediana parte longe subadpresse fulvo-pilosa; 3 interiora apice obtusa vel rotundata nervo mediano haud incrassato, in dorso basin tantum pilosa. Stamina tepalis fere duplo breviora. Filamenta lineari-spathulata, 25 mm longa, acuta, bifida, incissione lineari, laciniis acutis filamentis circ. 4-plo brevioribus, antheram fere aequilongam, bifurcationem attingentem imae basi gerentia. Stylus crassiusculus, apicem filamentorum fere attingens in $\frac{1}{2}$ parte superiore modice incrassata, elongato-conica, stigmatifera. Capsula immatura late oblonga, dense longeque fulvo-pilosa rudimentis tepalorum coronata.

Brasilia: prov. Minas Geraes, St. HILAIRE, Catal. C¹ no. 362 (Herb. Mus. Paris).

Imago photogr.: Herb. Lugd. Bat. no. 122.

Barbacenia gaveensis GOETH. et HENR. nov. spec. — Caudex erectus, elongatus, circ. 5 mm crassus, plus quam 15 cm longus. Folia trifaria, superposita ad 7 mm distantia; juniora pauca erecta; adulta circ. 6 horizontalia mox plus minusve reflexa; emarcescentia numerosa, reflexa; omnia anguste linearia, cuspidata, usque ad 22 cm longa, 5 mm lata, plana vel subcanaliculata, striata, nervo mediano subtus prominente angusto, rotundato, carinata, margine carinaeque denticulis acutissimis, subadpressis remotis serrata, vaginis dilatatis, amplexantibus, rotundatis, sulcatis, opacis, brunneo-fuscis, vetustioribus laceratis. Flores subterminales, solitarii (rubri?). Scapus tenuior, obsolete trigonus, praeter glandulas paucas breviter stipitatas infra florem, glaber, circ. 15 cm longus, folia superans. Perigonii tubus clavatus (subtrigonus?) circ. 18 mm longus, apice 6 mm amplius, tribus partibus ovario adnatus, irregulariter, circ. 12-costatus; costae 6 in tepalorum mediano se continuantur aculeolis brevibus obtusis, remotis, notatae; costae intermediae glabrae vel basin

versus minute verruculosae. Tepala erecto-patentia, circ. 5 mm lata, (apices tepalorum omnium in specimine unico a me viso defracti) (oblongo-lanceolata?). Filamenta obovato-lineararia, binervia, circ. 8—9 mm longa, $2\frac{1}{2}$ mm lata, apice profunde bifida, laciniis parallelis, lanceolatis, apice obtuseulis vel rotundatis, $2\frac{1}{2}$ mm longis, ima basi antheram, fere basifixam, incisionem attingentem ferentia. Stylus medias antheras superans; parte sigmatifera vix incrassata, conica, circ. $2\frac{1}{2}$ mm longa, stigmatibus lineari-oblongis. Cetera ignota.

Brasilia: in cacumine montis. „Gavea” dicta ubi leg. cl. GLAZIOU 29 junio 1875 (sine numero).

Imago fotogr.: Herb. Lugd. Bat. no. 152.

Barbacenia gentianoides GOETH. et HENR. nov. spec. — Caudex brevis vel brevissimus, interdum adscendens, simplex vel furcatus, squamis griseo-brunneis, plus minusve fissis, arete adpressis, dense tectus. Folia rosulata, numerosa; juniora erecta cetera reflexo-patentia; dein marcescentia, lineari-lanceolata, acuminata, nervo mediano subtus paulum prominente tenuiter carinata, rigida, plana, striata, acumine complicato, pungentia 3—8 cm longa, circ. 5 mm lata, subtus plus minusve dense adpresse albo-pubescens, supra glandulis sessilibus vel brevissime stipitatis, hyalinis, densiuscule vestita, margine superne pilis brevibus hyalinis in glandulas parvas terminatis, basin versus pilis longis, albidis, subulatis ciliata. Flores 1—2 per rosulam, ignei, sessiles, folia superantes. Perigonii tubus longe cylindricus, faucem versus ampliatus, circ. $\frac{1}{5}$ parte ovario ovoideo, subtrigono obsolete costato adnatus, breviter densiuscule fulvopilosus vel interdum fere glaber. Tepala aequilonga, tubo breviora, lineararia, apice breviter acuminata mucronulata, parallelinervia, ad 24 mm longa, 4 mm lata, juniora saepe canaliculata, erecta, deinde erecto-patentia et patentia. Filamenta hyalina, membranacea, 3 exteriora paulo breviora usque ad $\frac{2}{3}$ partes in tubum cylindricum connata, dein apicem versus leviter emarginatum angustata, laciniis brevissimis acutis, nervo mediano crasso, saepe nervis 3—4 confertis formato, hinc illine nervos paucos laterales oblique emittente, perducta; prope apicem antheras lineares fere basifixas circ. 10 mm longas, post anthesin plus minusve recurvatas, gerentia. Stylus filiformis subflexuosus, stamina longe superans, parte sigmatifera ovoidea, modice incrassata.

Brasilia: prov. Minas Geraes. GLAZIOU no. 19922—: Rio dos Pedros au Valu, 2 Mai 1892. Fleurs rouges-pourpres. Typus in H. L. B. sub no. 812. 180—582; RIEDEL no. 1422. Serra da Lapa in fiss. rupium; St. HILAIRE

Catal. B² no. 2164 (Herb. Mus. Paris.: SCHWACKE no. 8351— Zwischen As Dattas und Parauna auf Felsen. 19 avril 1892.

Imag. fotogr.: Herb. Lugd. Bat. no. 144 et 145.

Barbacenia glabra GOETH. et HENR. nov. spec. — Tota planta glaberrima. Caudex brevis, simplex, ad 2 cm crassus, basibus foliorum emortuorum, irregulariter fissis, subopacis, fumigatis, densissime vestitus. Folia spiraliter disposita ad 12 subrosulata; interiora erecta; cetera patentia usque ad horizontalia, in parte superiore incurvata; omnia anguste linearia, subulato-acuminata, ad 28 cm longa, 4 mm lata, striata, nervo medio subtus prominente acute carinata, marginibus (in sicco) revolutis, basin versus anguste membranaceis, item ac carina denticulis brevibus acutis subadpressis remotis, praeditis; paullatim in vaginas amplectentes late ovatas, adpressas, fumigatas, sulcatas, subnitentes dilatata. Scapus solitarius subterminalis, teretiusculus, 15 cm longus foliis brevior. Perigonii tubus elongato-cylindricus, 40 mm longus, 3 mm crassus, 24-costulatus, tertia parte ovario elongato-clavato 13 mm longo adnatus. Limbus cupuliformis; tepala 15 mm longa; 3 exteriora ovato-lanceolata acuta mucronata, 3—4 mm lata parallelinervia; 3 interiora ovata 7—8 mm lata acutiuscula, mucronulata oblique nervosa. Filamenta linearia, 6 mm longa, 1 mm lata, hyalina, apice bifida; incisione angusti, laciniis acutis, parallelis, filamento triplo brevioribus; prope basin antheram dorsifixam, apice acuto, incisionem vix attingentem, basi rotundata ultra filamentum basin ad 2 mm porrectam, gerentia. Stylus filiformis, filamenta aequans, parte stigmatifera vix incrassata, trigona fere longitudine filamentorum, stigmatibus linearibus. Capsula ignota.

Brasilia: Minas Geraes, leg. A. DE ST. HILAIRE. Catal. C¹ no. 352 in Herb. Mus. Paris.

Imago fotogr.: Herb. Lugd. Bat. no. 137.

Barbacenia Glaziovii GOETH. et HENR. nov. spec. — Caudex ignotus, probabiliter brevis. Folia ad 6 subrosulata, erecta et erecto-patentia, leviter incurvata, emarcida reflexa; linearia, longe cuspidata, plana, tenera, striata, utrinque subadpresse breviter pilosa, margine integra pilis albidis longioribus remotis erecto-patentibus, in glandulas parvas oblongas abeuntibus subciliata; nervo mediano subtus paullum prominente anguste carinata, circ. 25 cm longa, 6 mm lata. Flores ad 3 per rosulam, rubri. Scapi foliis multo longiores, erecti, flexuosi, trigoni, inferne fere glabri, a medio pilis longioribus majoribus et minoribus glanduliferis, patentibus, remotiusculis obsiti, circ. 33 cm longi. Ovarium

obovato-oblongum, subtrigonum, pilis crassis brevibus in glandulas majores abeuntibus, remotis, intermixtis pilis glanduliferis minoribus tenuioribusque vestitum, circ. 12 mm longum, 4 mm crassum. Perigonii tubus elongatus, $\frac{1}{4}$ parte ovario adnatus; supra ovarium angustatus, cylindricus, prope faucem ampliatus, inferne $2\frac{1}{2}$ mm, fauce 7 mm amplius, breviter parce glanduloso-pilosus, circ. 50 mm longus. Tepala erecta; 3 exteriora longiora, angustioraque, lanceolata, acuminata, ipso apice anguste rotundata, circ. 23 mm longa, 5 mm lata, obsolete nervosa, extus parce brevissime glandulosa; 3 interiora late oblonga, obtusa, parallelinervia, circ. 19 mm longa, 8 mm lata, glabra. Stamina tepalis exterioribus fere duplo breviora. Filamenta e basi dilatata sensim angustata circ. 8 mm longa, usque ad $\frac{1}{3}$ bifida, laciniis parallelis angustis, obtusis, prope bifurcationem antherum circ. 12 mm longam gerentia, cujus basis basin filamenti fere attingit, cujus apex apicem filamenti 5 mm superat. Stylus filiformis, parte stigmatifera paullum incrassata, obovato-oblonga, apicem antherarum vix attingens.

Brasilia: prov. Minas Geraes. GLAZIOU no. 19930. „Birybiry près de Diamantina, entre les pierres, 23 Mars 1892. Fleurs rouges”. Typus in H. L. B. 912.180—578.

Imago fotogr.: Herb. Lugd. Bat. no. 134.

Barbacenia globata GOETH. et HENR. nov. spec. — Caudex brevis, crassus, furcatus, foliis numerosis emarcidis reflexis, caudice arcute adpressis tectus, ob eam rem globatus, circ. 6 cm longus et crassus. Folia rosulata erecta, serius horizontalia et reflexa, linearia, breviuscule cuspidata, 7—8 cm longa, 5 mm lata, plana, nervo mediano subtus paullum prominente anguste carinata, utrinque brevissime subadpresse pilosa, margine integra, basin versus longe ciliata. Flores parvi lutei, ad 3 per rosulam. Scapi erecti pseudoterminalis, foliis breviores, filiformes, glandulis breviter stipitatis, superne in glandulas longius stipitatas ovarii transeuntibus. Perigonii tubus cylindricus, brevis, circ. 12 mm longus, 5 mm amplius, $\frac{1}{2}$ parte ovario adnatus, glandulis tenuiter stipitatis, pilis glanduliferis minoribus intermixtis, in ovario numerosioribus, densiuscule obsitus. Tepala erecta, tubo 3-plo breviora, a basi lata angustata, apice latiuscule rotundato inflexo; 3 exteriora toto dorso, 3 interiora secus nervum medianum tantum pilis glanduliferis praedita. Filamenta membranacea, trapezoidea, 2 mm longa, basi 1.6 mm, apice 0.5 mm lata, fere usque medium bifida, laciniis triangularibus acutis, prope bifurcationem antheram circ. 3.5 mm longam, apicem et basin filamenti excedentem gerentia. Stylus filiformis, parte stigmatifera vix incrassata fere globosa, insertionem antherarum attingens.

Brasilia: prov. Minas Geraes, SCHWACKE no. 8359 (Herb. Berol.) „Bl. gelb. Min. Ger.. Auf Felsen in den Bergen beim Rio dos Pedros, 28 avril 1892”.

Imag. fotogr.: Herb. Lugd. Bat. no. 110.

Barbacenia glutinosa GOETH. et HENR. nov. spec. — Acaulis. Folia pauca (4—7) subrosulata, erecto-patentia, exteriora siccitate saepe contorta, late lanceolata, breviuscule acuminata, plana, densissime glutinoso-tomentosa, pilis in glandulam minutam abeuntibus. Flores 1—2 pseudo-terminales, coccinei. Scapi foliis breviores vel subbreviores, erecti, pilis longis, in glandulam parvam abeuntibus, flexuosis, patentibus, rufescentibus dense vestiti. Perigonii tubus urceolatus, ad 10—15 mm longus, plus quam $\frac{1}{2}$ parte ovario subtrigono adnatus, pilis ut in scapo ocurrent, apicem versus sensim decrecentibus, densissime vestitus. Tepala erecta, triangularia, apice rotundata, ad 7 mm longa, 3—4 mm lata, dorso longiuscule dense glanduloso, pilosa, fauce fere claudentia. Filamenta hyalina, late linearia, usque ad basin fere bifida, laciniis parallelis, acutiusculis, venis medianis ex insertione antherae prope filamenti basin oriundis, perducta. Anthera longitudine filamenti, medio dorso affixa. Stylus parte stigmatifera paullum incrassata breviuscule conica, basin antherarum attingens.

Brasilia: Prov. Minas Geraes. RIEDEL no. 1060. „Barb. acaulis, glutinosa, cor. subelaua, fl. coccineis. Arenos. M. da Lapa, nov. dec. 1824”.

Typus in H. L. B. sub no. 937.47—337.

Imago fotogr.: H. L. B. no. 127.

Barbacenia Goethartii HENRARD nov. spec. — Caudex erectus, brevissimus, incrassatus, usque ad 3 cm longus, 1 cm crassus. Folia spiraliter disposita, subrosulata, horizontalia, leviter incurvata, lineari-triangularia, subulato-acuminata, acumine in foliis vetustioribus circinnatim recurvato, ad 7 cm longa, 4—5 mm lata, striata, subcanaliculata, nervo mediano prominente, subtus tenuiter carinata, supra glabra, subtus, praesertim apicem versus denticulis brevissimis deplanatis, acutis, sparsis, scabriuscula, margine carinaeque denticulis vel squamulis denticulatis, cuspidatis minute ciliato-serrata. Flores parvi, ad 1—3 per rosulam, subterminales. Scapus brevis, ad 1 cm longus, breviter glanduloso-scaber, teretiusculus. Tubus perigonii cylindricus, basin versus paullatim angustatus, ad 2 cm longus plus quam dimidia parte ovario adnatus, circ. 18-costatus, costis breviter remotiuscule glanduloso-pilosis. Tepala erecto-patentia ad 8 mm longa, 3 exteriora angusta, lanceolata, acuminata, parallelinervia, ad

2½ mm lata, extus breviter sparseque glanduloso-pilosa; 3 interiora oblonga obtusa, submucronulata, oblique venosa, ad 4—5 mm lata, extus glabra. Filamenta late linearia, apice rotundata circ. 5 mm longa, 1½ mm lata, membranacea, punctata, binervia, incisione angustissima dimidium filamentum haud attingente bifida, laciniis lanceolatis, acutis. Anthera ima basi filamentum dorsifixum, tertia fere parte longitudinis filamentum excedens, incisionem vix attingens. Stylus filiformis, filamenta superans, parte stigmatifera incrassata, ovoidea. Capsula immatura ellipsoideo-trigona, supra basin constricta, evidenter 12-costata, costis remotiuscule stipitato-glandulosis, parte libera perigonii emarceidi striati, coronata.

Brasilia: prov. Minas Geraes (ad Penha?), ubi leg. ST. HILAIRE sine no. (Hb. Paris sub nomine *Barb. minuta*, non *B. minuta* DINTER).

Imago fotogr.: Herb. Lugd. Bat. no. 136.

Barbacenia Hilairei GOETH. et HENR. nov. spec. — Caudex brevis, foliis reflexis numerosis apice contortis velatus. Folia spiraliter conferta, numerosa; interiora circ. 9, canaliculata, patentia, cetera numerosa plana, reflexa, apice contorta, omnia linearia, circ. 10 cm longa, 7 mm lata, acutissima, striata, nervo mediano tenui, subtus vix prominente, breviter subadpresse pubescens, margine dense, superne breviter, basin versus longe ciliata. Scapi plures, filiformes, folius fere duplo breviores, pilis tenuibus, breviusculis, patentibus, subtortuosis, densiuscule obsiti. Perigonii tubus cylindricus, ad 5 cm longus, 4—5 mm crassus, faucem versus sensim paulum ampliatus, curvatus, costatus, superne fere glaber, basin versus et in $\frac{1}{5}$ parte ovario clavato adnatus, densiuscule pilosus, pilis longiusculis subulatis, flexuosis divergentibus, apicem versus gradatim brevioribus. Tepala tubo triplo breviora, patentia, linearia, obtusa, mucronulata, parallelinervia; 3 exteriora dorso breviter pilosa, circ. 14 mm longa, 3 mm lata. Filamenta linearia, circ. 5½ mm longa, apice incisione triangulari breviter bifida, laciniis acutis, parallelis, infra incisionem antheram linearem, dorsifixam, basin filamentum attingentem, apicem duplo superantem gerentia. Stylus filiformis, parte stigmatifera ellipsoidea, stamina aequans. Capsula breviter ellipsoidea, circ. 12 mm longa, 9 mm lata, costis circ. 18, filiformibus, breviter densiuscule pilosis perducta, inter costas glabra, tubo emarceido coronata.

Brasilia: prov. Minas Geraes. A. DE ST. HILAIRE, Catal. B¹ no. 635. (Herb. Mus. Paris).

Imago fotogr.: Herb. Lugd. Bat. no. 119.

Barbacenia hirtiflora GOETH. et HENR. nov. spec. — Caudex ignotus.

Folia ad 10, subrosulata, erecta, serius patentia et plus minus reflexa, linearia, longe acuminata, cuspidata, plana, striata, glabra (glauca?) anguste carinata, margine carinaeque pilis longis deplanatis angustissimis erecto-patentibus, fusco-atris ciliata, usque ad 20 cm longa, 10 mm lata. Flores ad 1—3 pseudoterminalis, saturate lilacini. Scapi foliis sublongiores, validi, erecti, plus minusve flexuosi, subtrigoni, sulcati, inferne parce, apicem versus sensim densius et mox densissime pilosi, pilis longis, patentibus, tortuosis, atro-rufescentibus, subuliformibus, eglandulosis (v. glandulis minutissimis praeditis?) vestiti. Perigonii tubus urceolatus, saepissime paullum supra medium angustatus, apicem versus denuo ampliatus, fere $\frac{1}{2}$ parte ovario adnatus, pilis ut in scapo occurrent, in glandulam minutam abeuntibus densissime vestitus, usque ad 25 mm longus, 8 mm latus. Tepala erecta, tubo fere 2-plo breviora, elongato-triangularia, apice rotundata; 3 exteriora, dorso dense longiuscule glanduloso-pilosa; 3 interiora apice obtusa submucronulata, glabra. Filamenta hyalina, linearia vel in parte superiore oblonga usque ad medium bifida, laciniis subparallelis acutis, cuspidatis, circ. 6—7 mm longa, antheram dorsifixam, circ. 10 mm longam filamenti apicem plus quam basin excedentem infra medium gerentia. Stylus filiformis, apicem filamentorum vix attingens, parte stigmatifera paullum incrassata, elongato-conica.

Brasilia: prov. Minas Geraes; GLAZIOU no. 19927a „Diamantina au Curalhino, sur les rochers, 14 avril 1892. Fleurs lilas foncé. Typus in Herb. Berol.

Imago fotogr.: Herb. Lugd. Bat. no. 126.

Barbacenia inclinata GOETH. et HENR. nov. spec. — Caudex brevissimus, erectus, ad $1\frac{1}{2}$ cm crassus. Folia dense spiraliter disposita; 4—5 interiora erecta, angustiora et multo breviora, quorum intima pedunculum cinguntur; adulta circ. 6, patentia, horizontalia, plana subcanaliculata late linearia, in acumen breviusculum, complicatum, recurvatum angustata, circ. 7—14 cm longa, 12—18 mm lata, acumine 15—25 mm longo, striata, marginata, nervo mediano subtus prominente anguste carinata, margine carinaeque denticulata; denticuli apicem versus et praesertim in foliis junioribus crebri, longiores, patentes, serraturiformes, apicibus saepe recurvatis; basin versus gradatim rariores minoresque; marginales multo breviores in series transversales ordinati vel in squamulas dentatas coaliti. Flores subterminales, majores, nutantes vel horizontales, rubri. Pedunculus validiusculus, 14—20 cm longus, folia longe superans, subflexuosus, erectus, trigonus, striatus, basi glaber, ceterum glandulis parvis, stipitatis, remotis, apicem versus numerosioribus et

paullo majoribus seabriuseculus. Perigonii tubus circ. 20 mm longus, clavatus, vel supra ovarium fere duplo brevius, 5 mm crassus, constrictus, deinde campanulato-ampliatum, 12-costatus; costae glandulis parvis stipitatis remotiuseculis in parte libera tubi rarioribus praeditae. Tepala erecta, ad 30 mm longa, lanceolata, parallelinervia; 3 exteriora ad 5 mm lata, acuta, extus breviter glandulosa; 3 interiora ad 7 mm lata, acutiusecula in nervo mediano tantum glandulosa. Stamina tepalis paullo breviora. Filamenta ad 22 mm longa, membranacea, petaloidea, longe unguiculata, limbo obcordato, circ. 7 mm longo, 6 mm lato, ungue circ. 15 mm longo, basin versus sensim paullo angustato; nervo mediano crasso cujus apex in parte basali limbi truncatus, in apice et in parte inferiore limbi venas binas erecto-patentes, prope marginem bi- vel trifurcatas emittente, perducta. Antherae haud procul a basi in apice nervi mediani filamenti dorsifixae, circ. 1 cm longae, $\frac{2}{5}$ partibus filamentum excedentes. Stylus filiformis, longus, curvatus, stamina vix superans, parte stigmatifera paulum incrassata, oblongo-cylindrica ad 3 mm longa. Capsula ignota.

Brasilia: Prov. Minas Geraes, GLAZIOU no. 19921 „Serra dos Crystaes près Diamantina sur les rochers (Minas) 4 avril 1892. Fleurs rouges”. Typus in H. L. B. sub no. 912.180—583.; SCHWACKE no. 8358, Birybiry bei Diamantina, auf Felsen, 24 mars. 1892.

Imag. photogr.: Herb. Lugd. Bat. no. 150 et 176.

Barbacenia itabirensis GOETH. et HENR. nov. spec. — Caudex brevis, crassiuseculus, squamis, arete adpressis, in fibris solutis, resina propria conglutinatis, junioribus in parte basali recurvatis, foliorum delapsorum praeditis, tectus. Folia ad 8 rosulata, glaucescentia, interiora erecta, exteriora horizontalia et reflexa; omnia e basi lata, membranaceo-marginata, linearia, a medio fere triangularia, in apicem brevem filiformem angustata, striata, anguste leviter carinata, margine carinae pilis remotis subadpressis, subuliformibus, basi incrassatis, praedita, cetera glabra, ad 40 cm longa 8—10 mm lata. Flores lutei (solitarii?). Scapus trigonus, striatus, foliis subbrevior, superne pilis glanduliferis numerosioribus, breviuseculis, infra medium gradatim minoribus rarioribusque, basin versus glaber. Ovarium obovato-clavatum, subtrigonum, glandulis breviusecule stipitatis dense vestitum. Perigonii tubus supra ovarium paulum constrictus, deinde campanulato-ampliatum, $\frac{1}{2}$ parte ovario adnatus, in parte libera glandulis stipitatis quam in ovario paulo rarioribus praeditus, in alabastro circ. 25 mm longus, 6 mm amplius. Flores maturi non vidi. Tepala erecta, parallelinervia; exteriora fere triangularia, circ. 17 mm longa, basi 5 mm lata, apice anguste rotundata, dorso densiusecule

stipitato-glandulosa; interiora paullo breviora et latiora acuminata, glabra. Stamina (ab insertione filamenti usque ad apicem antherae) circ. 13 mm longa. Filamenta late linearia ad $7\frac{1}{2}$ mm longa, usque a medio fere bifida, laciniis fere parallelis, anguste triangularibus obtusiusculis, prope bifurcationem antheram 15 mm longam gerentia, ejus basin filamentum paullum, ejus apex filamentum longe superat. Stylus filiformis, filamenti apicem vix superans, parte stigmatifera quam stylo duplo crassiore, lineari-oblonga. Species imperfecte cognita!

Brasilia: prov. Minas Geraes; GLAZIOU no. 17827 „Pico d'Itabira do Campo, entre les pierres (Minas) le 20 dec. 1888. Fleurs jaunes” (Herb. Berl.; Herb. propr. cl. Glaziovii).

Barbacenia lilacina GOETH. et HENR. nov. spec. — Caudex ignotus, probabiliter brevis. Folia conferta, numerosa, ad 12, erecta et erecto-patentia, exteriora (pauca) horizontalia vel plus minusve reflexa, linearia, saepe plus minusve curvata, longe acuminata, utrinque pilis deplanatis anguste lanceolato-linearibus, acutis, subadpressis, hirsuta, plana, vel interdum complicata, striata, nervo mediano subtus altius prominente anguste carinata, margine integra, pilis longioribus ciliata, vaginis arcte adpressis, resina propria, conglutinatis. Flores lilacina 1—2 per rosulam. Scapus foliis subbrevior vel (saepius) longior, subtrigonus, sulcatus, glandulis gracilibus stipitatis dense vestitus. Perigonii tubus breviuscule cylindricus, basi rotundatus, ad 20 mm longus, 7 mm amplius plus quam $\frac{1}{2}$ parte ovario obsolete trigono adnatus, glandulis stipitatis densissime vestitus. Tepala longitudine partis liberae tubi, primum erecta, deinde horizontalia, recurvata, circ. 12 mm longa, 4—5 mm lata; 3 exteriora e basi sensim attenuata apice rotundata, dorso densissime stipitato-glandulosa; 3 interiora linearia, apice late rotundata, mucronulata, extus mediano serie glandulorum minorum notata. Stamina tepalis breviora. Filamenta oblongo-lanceolata, basi dilatata usque ad $\frac{1}{3}$ vel $\frac{1}{2}$ bifida, incisione lineari, laciniis acutis, in medio fere vel inferius antheram, basin et apicem filamenti aequantem, gerentia. Stylus incisionem filamentorum vix attingens, parte stigmatifera paullum incrassata, elongato-conica.

Brasilia: prov. Minas Geraes, leg. GLAZIOU no. 19926. Serra do Funil au Rio Paranaíba sur les rochers, 20 avril 1892. Fleurs lilas foncé. Typus in H. L. B. sub no. 912.180—527.

Fortasse formae duae distinguendae sunt, quarum una, var. **pallidiflora** HENR. nov. var. (Glaziov no. 19925 Curalhino près Diamantina, dans le campo, 14 avril 1892. Fleurs lilas) foliis pilosioribus, filamentis profundius bifidis, antheris in medio filamentum fere prope bifurca-

tionem insertis, floribus pallidioribus et caudice incrassato a typo differt.

Imago photogr.: H. L. B. no. 128 et 129.

Barbacenia longiscapa GOETH. et HENR. nov. spec. — Caudex brevissimus, usque ad 7 cm longus et $1\frac{1}{2}$ cm crassus, basibus foliorum vestitorum pallide-brunneis, tenuibus, striatis, tectus. Folia ad 8—15 dense spiraliter disposita (praeter pauca interiora erecta) patentia vel reflexa, linearia, longe acuminata, recurvata, 10—23 cm longa, 10—17 mm lata, canaliculata vel complicata, rigida, striata, nervo mediano subtus valde prominulo, carinata, margine carinae serrulato-denticulata, denticuli magni acuti, apicibus leviter recurvatis, marginales inferiores saepe transverse dilatati, bicuspidati vel binati. Flores solitarii, rubri inclinati. Scapus elongatus, erectus, flexuosus, usque ad 35 cm longus, validus, trigonus, costatus, glandulis parvis brevissime stipitatis, apicem versus paullo majoribus rarioribusque scaber. Tubus perigonii circ. 18 mm longus, ovario oblongo circ. 18-costato, in costis tuberculato-glanduloso, adnatus, faucem versus abrupte ampliatus. Tepala erecta, post anthesin plus minusve patentia, tubo plus quam sesquilingiora, circ. 30 mm longa; 3 exteriora lanceolato-linearia, acuta, circ. 3—4 mm lata, parallelinervia, extus secundum nervos, glandulis punctiformibus scabra; 3 interiora lanceolata, 7—8 mm lata, acutiuscula, nervis parallelis, venis transversis, validis conjunctis perducta, extus in nervo mediano tantum scabra. Filamenta membranacea, hyalina, spathulata, quasi unguiculata, circ. 18 mm longa, apice bifida, laciniis leviter divergentibus latis, rotundatis 3—4 mm longis, $2\frac{1}{2}$ mm latis, venis 3—4 ex apice nervi mediani crassi, prope incisionem abrupte truncati oriundis perducta. Antherae lineares, in dorso prope basin apici nervi mediani filamentum affixae, circ. 10 mm longae, lacinias ad 6 mm superantes. Stylus filiformis, elongatus in anthesi e flore exsertus, parte stigmatifera modice incrassata, obovato-oblonga. Capsula ignota.

Brasilia: RIEDEL no. 1062. In humid. rup. S. da Lapa. Dec. 1824. Typus in H. L. B. sub no. 937.47—336.

Imag. photogr.: Herb. Lugd. Bat. no. 140, 177, 178.

Barbacenia mantiqueirae GOETH. et HENR. nov. spec. — Caudex brevis, erectus vel adscendens, ad 7 cm longus, 1 cm crassus, squamis fuscis, sulcatis, late membranaceo-marginatis, quarum infimis in fibrillas longas fissis, tectus. Folia spiraliter disposita, remotiuscula; viventia ad 6—8, erecta quorum exteriora saepe apicem versus paullo incurvata; emarcida pauca, patentia usque ad horizontalia, incurvata; omnia rigida, anguste

linearia, acuta, usque ad 38 cm longa, 4—5 mm lata, subcanaliculata, nervo mediano subtus prominente tenuiter rotundato-carinata et margine incrassato, (in sicco) revoluta, pilis longis, paleaceo-deplanatis suberectis, albescens, dense vestita; in vaginam amplectentem oblongo-lanceolatam, sulcatam late membranaceo-marginatam dilatata. Pedunculus solitarius subterminalis, validiusculus, trigonus, striatus, superne a medio fere glandulis parvis atris, breviter stipitatis remotiusculis vestitus, foliis brevior, ad 27 cm longus. Perigonii tubus cylindricus, basi longe angustatus, circ. 18 mm longus, duabus partibus ovario (subtrigono?) costis 12 breviter stipitato-glandulosus perducto, adnatus. Tepala erecto-patentia, circ. 25 mm longa; 3 exteriora oblongo-lanceolata, acuminata, circ. 8 mm lata, parallelinervia; 3 interiora ovato-oblonga, circ. 11 mm lata, apice obtusa, oblique-nervosa. Filamenta oblonga, membranacea, binervia, 10 mm longa, 3 mm lata, apice bifida; laciniis filamento triplo brevioribus, parallelis, acutis, apice anguste rotundatis; ima basi antheras prope basin dorsifixas, filamento subbreviores, gerentia. Stylus filiformis, parte stigmatifera circ. 5 mm longa, vix dilatata, subuliformi, stigmata oblonga, staminum apicem haud attingens. Capsula ignota.

Brasilia: S. Paulo. Herb. Commissao geographica e geologica de S. Paulo no. 3570. leg. A. LÖFGREN „Pico dos Marins. Serra da Mantiqueira 10 janv. 1897”.

Observatio: B. purpureae similis, sed diversa: foliis margine revoluta, vix serratis cum carina paleaceo-pilosa, filamentis acute laciniatis, fabrica styli.

Imag. fotogr.: Herb. Lugd. Bat. no. 179, 180, 181, 182.

Barbacenia mollis GOETH. et HENR. nov. spec. — Caudex brevissimus. Folia interiora erecta et erecto-patentia; exteriora reflexa plana vel (juniora) canaliculata, linearia, acuta usque ad 12 cm longa, 12 mm lata, vix carinata, utrinque pilis tenuibus longiusculis hyalinis, in glandulas parvas oblongas terminatis densiuscule vestita. Scapus solitarius, foliis brevior, subtrigonus, striatus, pilis tenuibus, breviusculis, in sicco rubescentibus densiuscule obsitus. Perigonii tubus cylindricus, ad 27 mm longus, 4—5 mm latus, $\frac{1}{3}$ parte ovario oblongo quam tubus crassiore adnatus, pilis brevibus, patentibus, glanduliferis, apicem versus rarioribus, densiuscule obsitus. Tepala exteriora ignota; interiora erecto-patentia, obovata, lanceolata, obtusa, breviter mucronulata. Filamenta quadrangula, ad 4 mm longa, 1 mm lata, incisione paullum profunda, late triangulari, laciniis brevissimis, acutiusculis; in bifurcatione antheram fere basifixam, ad 9 mm longam gerentia. Stylus filiformis, parte stigmatifera modice

incrassata, ellipsoidea, inter stamina et tepala intermedius. Descriptio e specimine unico imperfecto.

Brasilia: prov. Minas Geraes. A. DE ST. HILAIRE no. C. 962 (Herb. Mus. Paris).

Barbacenia oxytepala GOETH. et HENR. nov. spec. — Caudex erectus, circ. 14 cm longus, 2 cm crassus, squamis fibroso-fissis, fusco-griseis subadpressis dense tectus, foliis vetustioribus numerosis reflexis velatus. Folia remotiuscula, spiraliter disposita, numerosa, primum erecta usque ad horizontalia; marescentia reflexa; omnia anguste linearia, cuspidata, striata, nervo mediano subtus paullum prominente tenuiter carinata, margine subincrassata carinaeque remote subadpresse denticulata, circ. 19 cm longa, 0.5 cm lata. Flores rubri, ad 2 per rosulam. Scapi validiusculi, trigoni, sulcato-striati, glabri, foliis breviores. Perigonii tubus elongatus, cylindricus, ad 5 cm longus, 4 mm crassus, partibus $\frac{2}{5}$ ovario subtrigono, cylindrico subcrassiore adnatus, obscure costatus, in costis pilis raris subuliformibus praeditus, fauce abrupte paullum ampliatus. Tepala erecta, dimidio tubo longiora, linearia acuta, parallelinervia; 3. exteriora extus brevissime subpilosa. Stamina tres partes tepalorum longa, erecta. Filamenta subcoriacea dimidiato-oblonga, apicem versus attenuata leviter emarginata laciniis brevissimis acutis, circ. 10 mm longa, 4 mm lata, antheram haud procul a basi dorsifixam circ. 15 mm longam, paullum infra apicem gerentia. Stylus filiformis inter stamina et tepala intermedius, parte stigmatifera oblongo-ovoidea, paullum incrassata. Cetera ignota.

Brasilia: prov. Minas Geraes ubi in rupibus humidis raro occurrit. SCHWACKE no. 8353. „Birybiry bei Diamantina, auf feuchten Felsen, Selten! März 1892”. Typus in Herb. Berol.

Imag. fotogr.: Herb. Lugd. Bat. no. 183.

Barbacenia polyantha GOETH. et HENR. nov. spec. — Caudex brevissimus. Folia numerosissima, usque ad 40, subrosulata, exteriora pleraque horizontalia vel plus minusve reflexa, interiora erecta, omnia linearia, superne angustata plus minusve contracta, breviuscule cuspidata, plana, striatula, nervo mediano subtus paullum prominente anguste rotundato-carinata, margine integra breviter, basin versus longiuscule ciliata, vaginis arete adpressis resina propria conglutinatis, 10—13 cm longa, 5—7 mm lata. Scapi numerosi, usque ad 12 per rosulam, erecti, subflexuosi, filiiformes, trigoni, sulcati, pilis in parte basali scapi albidis, brevibus, subadpressis, apicem versus gradatim in glandulis nigrescentibus, brevius-

cule tenuiter stipitatis transeuntibus obsiti. Flores parvi, erecti vel sub-inclinati, violacei. Perigonii tubus breviter cylindricus, basi angustatus, circ. 13 mm longus, 6 mm amplius fere $\frac{1}{2}$ parte ovario adnatus, pilis glanduliferis breviusculis et glandulis tenuiter, breviuscule stipitatis, densiuscule vestitus. Tepala erecta e basi paullum angustata, apice late rotundato-subinflexo, circ. 4—5 mm longa; exteriora toto dorso, interiora secus nervum medianum glandulis majoribus breviter stipitatis dense vestita. Stamina tepalis paullo breviora. Filamenta e basi dilatata fere quadrata, 2—2 $\frac{1}{2}$ mm longa profunde bifida, laciniis oblongis cuspidatis, prope bifurcationem antheram basin filamenti paullum, apicem longe superantem gerentia. Stylus crassiusculus, parte stigmatifera paullum incrassata, elongato-oblongo, apicem antherarum haud attingens.

Brasilia: prov. Minas Geraes. GLAZIOU no. 19931 „Pinheiro, près de Birybiry, entre les rochers 26 Mai 1892. Fleurs violacées. Typus in H. L. B. sub no. 912.180—579.

Imago fotogr.: Herb. Lugd. Bat. no. 113.

Barbacenia Riedeliana GOETH. et HENR. nov. spec. — Caudex brevissimus squamis griseis adpressis tectus. Folia ad 10, subrosulata, erecta et erecto-patentia; exteriora pauca horizontalia; nonnulla emarceida reflexa; omnia anguste linearia, leviter curvata, longe cuspidata, tenera, striatula, glabra, integra, basin versus anguste scarioso-marginata, circ. 15 cm longa, 4 mm lata. Flores lutei, solitarii. Scapus foliis vix longior, trigonus, inferne glaber, a medio fere pilis crassis brevibus patentibus in glandulas atras abeuntibus, apicem versus numerosioribus et paulum longioribus obsitus. Ovarium oblongum, acute trigonum, 12-costulatum; costae serie glandularum breviter stipitatarum remotiuscularum praeditae; inter costis brevissime sparse glandulosum, circ. 11 mm longum 3 mm crassum. Perigonii tubus ejus circ. $\frac{1}{7}$ pars ovario adnatus, circ. 75 mm longus, costulatus, supra ovarium angustatus, circ. 1 $\frac{1}{2}$ mm amplius, ubique parce glanduloso-pilosus, deinde faucem versus ampliatus, infundibuliformis, fere glaber, fauce 8 mm amplius. Tepala erecta linearia, circ. 20 mm longa, 3 $\frac{1}{2}$ mm lata, obtusa, mucronulata, parallelinervia, glabra. Stamina tepalis fere duplo breviora. Filamenta e basi lata angustata, filiformia circ. 6 $\frac{1}{2}$ mm longa, bifida laciniis fere parallelis, angustis, acutis fere $\frac{1}{3}$ parte filamenti longis, prope incisionem antheram gerentia, ejus basis basin filamenti haud attingit, ejus apex apicem filamenti 3 mm superat. Stylus filiformis, parte stigmatifera oblongo-cylindrica, stamina paullum superans.

Brasilia: prov. Minas Geraes in Serra da Lapa. RIEDEL no. 1058

(ex Herb. Fischer) „Barb. acaulis fl. lut. in fissur. rup. S. d. Lapa, nov. 1824”. Typus in H. L. B. sub no. 937.95—1.

Imago fotogr.: Herb. Lugd. Bat. no. 130.

Barbacenia Schwackei GOETH. et HENR. nov. spec. — Caudex ignotus. Folia ad 6 erecta, conferta, subcurvata, plana et canaliculato-complicata, acuta, striata, pilis deplanatis, albidis, anguste lanceolato-linearibus, breviusculis, subtus hirsuta, supra parce adpresseque pilosa, in carina paullum prominente et in margine haud manifeste ciliata. Flores ad 1—2 in apice caudicis, lutei. Scapus foliis brevior, trigonus, pilis longiusculis, subuliformibus, tortuosis, patentibus et erecto-patentibus, fulvis, dense vestitus. Perigonii tubus cylindricus, ad 20 mm longus, 8—9 mm crassus, $\frac{1}{2}$ parte ovario adnatus, totus pilis ut in scapo occurrent, apicem versus decreescentibus, vestitus. Tepala erecta, tubo plus quam triplo breviora, fere rectangularia, apice late rotundata, mucronulata, circ. 6 mm longa, 4—5 mm lata; 3 exteriora in toto dorso breviuscule pilosa; 3 interiora tantum in parte mediana dorsi. Filamenta plana, hyalina late linearia, usque a medio fere bifida, laciniis lanceolatis acutissimis, paullum divergentibus, tota margine glandulis parvis breviter stipitatis, hyalinis, remotiusculis praedita; nervo mediano, infra laciniis bifurcato perducta, antheram medium laciniarum attingentem basin filamenti circ. 3 mm excedentem prope basin gerentia. Stylus tepalorum basin haud attingens, parte stigmatifera paullum incrassata, conica.

Brasilia: prov. Minas Geraes; SCHWACKE no. 8357. „Bl. gelb. Minas Geraes. Serra de Cipó 25 avril 1892. Typus in Herb. Berol.

Imago fotogr.: Herb. Lugd. Bat. no. 125.

Barbacenia Sellovii GOETH. et HENR. nov. spec. — Caudex brevissimus, incrassatus, squamis griseis, plus minusve fissis apice curvato-reflexis, resina propria conglutinatis tectus. Folia rosulata; vegeta usque ad 8, erecta, vetustiora horizontalia et emarescentia reflexa; omnia linearia, cuspidata, plana, striata, glabra, nervo mediano subtus paullum prominente anguste carinata, margine longe densiuscule, carina brevius ciliata, 9—16 cm longa, 4—7 mm lata. Flores ad 1—4 per rosulam, pseudoterminales, sulfurei. Scapi foliis paullo longiores, trigoni, prope basin glabri, inferne pilis brevibus, subadpressis, albidis, gradatim in pilis longioribus patentibus, atris, glanduliferis et apicem versus in glandulis stipitatis ovarii transeuntibus, vestiti. Ovarium oblongum, trigonum, dense stipitato-glandulosum. Perigonii tubus usque ad 25 mm longus circ. $\frac{1}{2}$ parte ovario adnatus, supra ovarium paullum constrictus,

deinde campanulato- vel infundibuliformi-ampliatum, fauce circ. 12 mm amplius, in parte libera glandulis breviter stipitatis et pilis glanduliferis inferne densiusculis, faucem versus multo rarioribus praeditis. Tepala primum erecto-patentia, dein horizontalia recurvata, plus quam dimidium tubum longa, circ. 15 mm longa, 7 mm lata, oblonga, obtusa, mucronulata, parallelinervia; 3 exteriora paullum longiora, dorso breviter glanduloso-pilosa; 3 interiora secus nervum medianum tantum extus glandulifera. Filamenta late linearia, usque a medio fere bifida, laciniis anguste triangularibus vel lanceolatis, saepe plus minusve inaequalibus, circ. 5 mm longa, 1½ mm lata, prope bifurcationem antheram basin et apicem filamenti multo excedentem gerentia. Stylus filiformis trigonus, parte stigmatifera modice incrassata, oblongo-lineari, apicem antherarum haud attingente. Capsula immatura fere globosa.

Brasilia: prov. Minas Geraes. SELLO no. C. 311. Serra da Mooda ann. 1818. Typus in H. L. B. sub no. 937.95—5; WARMING 1084 in rupestribus subalpinis; Serra da Piedade. LHOTZKY, MARTIUS.

Barbacenia Seubertiana GOETH. et HENR. nov. spec. — Caudex brevis usque ad 7 cm longus, 1 cm crassus, simplex vel furcatus, erectus vel adscendens, squamis laceratis, fuscis, subadpressis tectus. Folia spiraliter disposita, conferta vel fere subrosulata; interiora circ. 8—10 erecta et erecto-patentia; sequentia plura horizontalia usque ad reflexo-patentia; emarcida diu persistentia reflexo-patentia vel reflexa; omnia saepius plus minusve curvata, subcanaliculata usque ad complicata, lineari-lanceolata vel linearia, acuminata, striata, nervo mediano subtus prominente tenuiter carinata, margine carinae serrulato-aculeolata, 7 usque ad 20 cm longa, 7—9 mm lata. Flores rubri, solitarii vel (rarius) bini, subterminales. Scapus foliis subbrevior, validus, subtrigonus, costatus, superne aculeolis brevibus, acutis, erecto-patentibus, apicem versus numerosioribus, scaber. Perigonii tubus 15—22 mm longus basin versus gradatim attenuatus, prope basin aculeolis, ut in scapo occurrent, scaber, tribus partibus ovario trigono, 12-costato adnatus; costae aculeolis acutis erecto-patentibus, quarum tres in aciebus ovarii magis prominentes et aculeolis majoribus praeditae in tepala exteriora continuantur. Tepala erecta, tubo fere aequilonga; 3 exteriora lanceolata, obtiuscula, mucronato-acuminata parallelinervia, nervo mediano extus minute aculeolato, circ. 5 mm lata; 3 interiora paullum latiora, obtiuscula, haud mucronata, glabra, margine angusta oblique nervosa. Filamenta circ. 8 mm longa, 3 mm lata, membranacea, binervia; nervis superne saepius furcatis; apice bifida, laciniis parallelis, fere quadratis, saepe emargi-

natis; ima basi antheras subbreviores fere basifixas gerentia. Stylus trigonus, medium staminum vix superans, in dimidia parte superiore vix incrassata, conica, apice rotundata, stigmatifera. Capsula ignota.

A *B. purpurea* diversa, foliis subrosulatis brevioribus, saepe curvatis aculeolis marginalibus approximatis; scapo tuboque perigonii aculeolis parvis acutis, nec glandulis obtusis obsito, glandulis styli deficientibus, flore rubra nec violaceo-purpurea. Hue pertinet *B. purpurea* HOOK.F. var. *minor* SEUBERT, in Fl. Bras. III. 1. p. 68.

Brasilia: Rio Janeiro; GLAZIOU no. 17824. Haut de la chaîne des Orgaos, sur les rochers, le 6 mars 1888, Fleurs rouges. Typus in H. L. B. sub no. 912.180—470; GLAZIOU no. 17296. „Serra dos Orgaos, à Faboinha sur les rochers, le 6 mars 1888. Fleurs rouges (H. L. B. sub no. 912.180—574; id. GLAZIOU no. 16387; Morro da Gavea au sommet entre les rochers, 30 oct. 1865. Fleurs rouges. GLAZIOU no. 3625; id. Pedra acu. Serra dos Orgaos à 2230 m alt., 22 oct. 1872. Fleurs rouges. GLAZIOU no. 6453; GARDNER 5897! Herb. Delessert, Herb. Berol.; GLAZIOU 4261! Herb. Berol.

Imag. fotogr.: Herb. Lugd. Bat. no. 146a, 156.

Barbacenia stenophylla (GOETH. et HENR. nov. spec. — Caudex 14 cm longus, 2—3 mm crassus, simplex (an semper?), teretiusculus, elongatus, erectus vel adscendens et prope basin radicans; vaginis foliorum arcte adpressis, sulcatis, tenuiter carinatis, fulvis, tectus; fere totus foliis emarceidis, persistentibus, saepissime reflexis, velatus. Folia trifaria, superposita ad 7 mm distantia; juniora nonnulla erecta; cetera, ad 5—10, erecto-patentia et patentia; emarceida numerosa, diu persistentia; omnia anguste linearia, subcanaliculata, longe cuspidata, circ. 8 cm longa, 2 mm lata, nervo mediano subtus prominente, rotundato, carinata, margine carinaeque denticulis acutis, densiusculis, subadpressis serrata, dein glabrescentibus. Flores subterminales, solitarii, rubri, folia longe superantes. Scapus 10—12 cm longus, filiformis, subtrigonus, sulcato-striatus, flexuosus, glandulis breviter stipitatis, apicem versus numerosioribus obsitus. Perigonii tubus circ. 8 mm longus, tribus partibus ovario ellipsoideo adnatus, parte libera infra faucem ampliata, urceolato-ovata, costis circ. 12, rariuscule verrucoso-glandulosis perductus. Tepala tubo duplo longiora, circ. 18 mm longa, erecto-patentia, subaequilonga; exteriora angustiora, 2½—3 mm lata, lanceolata, acuta, basi angustata, subunguiculata, parallelinervia, extus brevissime sparseque glanduloso-punctata; interiora circ. 5 mm lata, oblongo-lanceolata, obtusiuscula, mucronulata, oblique venosa, extus in parte basali serie mediana glandularum brevissimarum

notata. Stamina circ. quattuor partes tepalorum longa. Filamenta circ. 13 mm longa, membranacea, quasi unguiculata, profunde bifida, laciniis latis, divergentibus, obtiuseulis, interdum emarginatis perducta; nervo mediano crasso, haud procul ab incisione abrupte truncato et ibi antheram circ. 5 mm longam, apicem filamenti excedentem, prope basin dorsifixam gerente; laciniae venis duabus perductae, quarum una ex apice nervi mediani oriunda apicem laciniae attingit, altera parallela, interdum furcata, in dimidia fere altitudine nervi nascitur. Stylus filiformis, tepala aequans vel parum superans, in parte superiore vix incrassata cylindrica, 4 mm longa, stigmatifera. Capsula ignota.

Brasilia: Goyaz. GLAZIOU no. 22220a: „Morro do Salto entre les rochers, le 15 janvier 1895. Fleurs rouges”.

Imago fotogr.: Herb. Lugd. Bat. no. 154.

Barbacenia trigona GOETH. et HENR. nov. spec. — Caudex (brevis?), incrassatus, foliis emarcidis numerosis reflexis velatus. Folia numerosa (ad 12) primum erecta, dein erecto-patentia et curvato-patentia, emarcescentia reflexa, juniora complicata, vetustiora plana; omnia late linearia cuspidato-acuminata, circ. 20 cm longa, 1 cm lata, nervo mediano subtus modice prominente acutiuscule carinata, utrinque pilis subadpressis, longiusculis, deplanatis, angustis, albescens in carina saepe sublongioribus, binatis vestiti, margine subincrassata ciliis fuscis breviuscule ciliata. Scapi 3 per rosulam, foliis subaequilongi, validi, erecti, apicem versus flexuosi, obtuse trigoni, sulcati, inferne setis subuliformibus, subadpressis, antrorsum spectantibus, in tertia parte superiore scapi gradatim in setas glanduliferas, deinde in pilos glanduliferos breviores patentes, demum infra ovarium in verrucas transeuntibus. Perigonii tubus fere $\frac{2}{3}$ partibus ovario trigono, elongato-oblongo adnatus, fere 20 mm longus, supra ovarium paullum ampliatus, in parte ovariali glandulis majoribus fere sessilibus densissime positus vestitis, in libera parte glandulis verruciformibus paullo majoribus retrorsum spectantibus densiuscule praeditus. Tepala, tubo fere duplo breviora, erecto-patentia e basi lata sensim paullum angustata, apice late rotundata, circ. triplo longiora quam lata; 3 exteriora sublongiora, toto dorso glandulis verruciformibus margines versus decrecentibus et in pilos breves glanduliferos transeuntibus induta; 3 interiora dorso secus nervum medianum serie verrucis minoribus praedita. Stamina tepalis paullo breviora. Filamenta plana, late linearia fere 4-plo longiora quam lata circ. 8 mm longa, apice bifida, incisione triangulari laciniis acutis circ. 2—3 mm longis, antheram circ. 10 mm longam basin filamenti aequantem, haud procul a basi gerentia. Stylus capsulaque ignoti.

Brasilia: prov. Minas Geraes. Descriptio e specimine unico a cl. A. DE ST. HILAIRE lecto. St. Hilaire no. 489 „Milho Verde” (Herb. Paris).
Imago fotogr.: Herb. Lugd. Bat. no. 117.

Barbacenia viscosissima GOETH. et HENR. nov. spec. — Caudex brevis, simplex. Folia dense conferta, subrosulata; interiora circ. 6—8 erecto-patentia et patentia; exteriora reflexa marcescentia apicibus involutis; omnia lineari-lanceolata usque ad linearia, plana, acutissima, striatula, nervo mediano subtus vix prominente, utrinque dense breviuscule glanduloso-pubescencia, viscosissima, ad 9 cm longa, 9 mm lata. Flores solitarii, subterminales, coccinei. Scapus foliis plus quam duplo brevior, pilis tenuibus, longiusculis, patentibus, glandula parva oblonga terminatis dense vestitus. Perigonii tubus longe campanulato-cylindricus, usque ad $5\frac{1}{2}$ cm longus, costatus, circ. in $\frac{1}{6}$ parte ovario oblongo adnata, pilis ut in scapo praeditus, dense glanduloso-pilosus, supra ovarium angustatus ad 2 mm amplius, faucem versus pilis glanduliferis, paullatim brevioribus rarioribusque vestitus. Tepala ovario circ. sesquolongiora, oblonga, circ. 15 mm longa, 6 mm lata, parallelinervia; 3 exteriora vix angustiora, acutiuscula, extus breviter glanduloso-pilosa; 3 interiora obtusa, breviter mucronulata, glabra. Stamina tepalis fere duplo breviora. Filamenta rectangularia, apice late triangulari-emarginata, laciniis brevissimis, acutis, ad $2\frac{1}{2}$ mm longa, 1 mm lata, prope apicem antheram linearem, fere 9 mm longam, dorsifixam, filamenti basin paullum, apicem fere duabus partibus excedentem, gerentia. Stylus filiformis, parte stigmatifera incrassata, tripartito-globosa, stamina aequans. Cetera ignota.

Brasilia: RIEDEL no. 205 „Barbacenia glutinosa, flor coccineis in rupibus St. João” Junio '24. Typus in H. L. B. sub no. 937.95—2. et in Herb. Leningrad.

Imag. fotogr.: Herb. Lugd. Bat. no. 121.

Vellozia Alexandrinae (SCHOMBURGK) GOETH. et HENR. nov. comb. = *Barbacenia Alexandrinae* SCHOMBURGK; in SCHOMBURGK, Die Barbacenia Alexandrinae, entdeckt und beschrieben. Tract. Braunschweig 1845. et ex HOOKER Journ. of Bot. IV (1845) p. 13. *V. tubiflora* HUMB. BONPL. et KUNTH in Nov. Gen. et Spec. p. 119 = *Radia* v. *Campderia tubiflora* RICHARD in KUNTH Syn. Pl. I (1822), huc non pertinet. Descriptio non quadrat.

Caudex 3—4 m altus, dichotomus. Rami crassi, diametro circ. 30—40 mm, rotundato-trigoni. Tunicae valde auctae, arcte adpressae, dense

imbricatim dispositae, apice late convexae, emarginatae, juniores apice breviter extus revolutae, mox breviter fissae, dorso remote acuteque costatae, piloso-tomentosae. Folia circ. 30—50 cm longa, 12—15 mm lata, linearia, in apicem fere filiformem sensim angustata, integerrima, obsolete carinata, marginibus in sicco revolutis, undique pube brevi, subtus longiore, sericea, fasciculato-sublepidota, obtecta, pilis marginalibus longioribus, praesertim versus basin folii. Flores speciosi, albi, extus rubescentes plurimi per rosulam. Pedunculi 7—12.5 cm longi (sec. SCHOMBURGK), basi laeves. Ovarium inferum, oblongum, obtuso-trigonum, tubo perigonii paullo latius, densissime tuberculis glandulosis praeditum. Tepala in tubum circ. 7 cm longum, cylindricum hirtum, supra ovarium tuberculis glandulosis, sparsis connata. Lacinae circ. 5 cm longae, medio 7 mm latae, acuminatae, basi angustatae, exteriores dorso scabro-punctatae, marginibus latiuscule-laevibus, interiores paullo latiores, fere omnino laeves; omnes aequilongae. Stamina 18, in phalanges 6 disposita, laciniis perigonii opposita. Filamenta in tubo profunde adnato-decurrentia, prope basin laciniarum breviter libera. Antherae lineares circ. 15 mm longae. Stylus perigonio paullo brevior. Stigma trilobo-peltatum. Capsulae non vidi, secundum SCHOMBURGK triloculares, apice truncatae. Semina numerosa, cuneato-trigona, apice truncata.

Guiana Anglica, in montibus Roraima, 1000—1400 m.s.m. SCHOMBURGK no. 1569. Specimina vidi e Mus. Bot. Berol.; Herb. Leningrad; Herb. Delessert.

Imago fotogr.: Herb. Lugd. Bat. no. 95.

Vellozia ambigua GOETH. et HENR. nov. spec. — Caudex erectus, ad 1 m altus, usque ad 2½ cm crassus, apice divisus, tunicis adpressis elongato-rectangularibus in spiris 3 abrupte ascendentibus ordinatis tectus. Tunicae fusco-flavae, nitidae, superne griseae, dorso sulcatae, apice late truncatae mox in fibris griseis solutae. Folia in vertice ramorum spirali-ter disposita, subrosulata, numerosa (circ. 15) erecto-patentia, lineari-triangularia (circ. 7 mm lata, 12 cm longa) linea recta transverse secedentia, faciebus subtiliter sulcata, nervo mediano tenui margineque spinuloso-serrata, apice rotundata, vaginis dorso glutinosis. Flores speciosi, solitarii, pseudo-terminales; pedunculus validus trigonus, stramineus, sulcatus, superne glandulis breve stipitatis stramineis obsitus, folia aequans v. multo brevior. Ovarium clavato-vel oblongo-trigonum, vertice coarctatum ad basin stipitato-glandulosum, nitente flavo-fuscum, angulis saepissime acutis, circ. 6—7 mm latum, 2—3 cm longum. Tepala ovalia apice late rotundata, coerulea. Stamina 30, in phalanges 6, basi squa-

mulis laceris fultas, ordinata, tepalis plus quam 2-plo breviora; antherae filamentis longiores. Stylus trigonus stamina paullo superans. Capsulae ovario similes.

Brasilia meridion.: SELLO (in Hb. Berol.); Hb. Warming 1075. leg. WARMING in monte Serra do Piedade frequens (sub nom. *V. compacta* det. Seubert); SCHWACKE 9040. Minas Geraes. Itacoluma haud rara Hb. Berol.; WEDDELL. Minas Geraes (Hb. Paris); CLAUSEN id. (Hb. Paris).

Adnotatio: species *V. compactae* valde cognata; differt: dimensionibus minoribus omnium partium, staminibus 30. Ob. flores saepissime defecti multa specimina tamen vix distinguenda sunt.

Vellozia angustifolia GOETH. et HENR. nov. spec. — Suffrutex parvus. Caudex incrassatus, foliis reflexis arcuatis adpressis tectus, cetera ignota. Folia rosulata, anguste lanceolato-lineariter, ad 18 cm longa, 3 mm lata, apice anguste rotundata, subtus sulcata, carina acutiuscula margineque apicem versus remotiuscule serrato-aculeolata; interiora circ. 6 erecto-patentia, apicem versus bicarinata, prope basin subcomplicata, resinosa, exteriora numerosa, reflexa, plana, marcescentia. Flores emaricidi tantum vidi pseudoterminalia, ad 2 per rosulam, folia aequantes, pallide violacei. Pedunculi filiformes, sulcati, superne glanduloso-verrucosi, viscosi. Ovarium oblongo-clavatum, triquetrum, ima basi in angulis glanduloso-verrucosum, apice coarctatum, fusco-lutescens, nitens. Tepala patentia vel patentissima, lanceolata, acuta, circ. 25 mm longa. Stamina lineariter, circ. 15 mm longa, filamentis brevibus. Stylus filiformis, stamina superans. Stigma late trilobopeltatum. Capsula matura ignota.

Brasilia: Morro Cubatao entre les pierres (Goyaz) 11 avril 1895 Plante naine. Fl. bleu pale. leg. GLAZIOU no. 22213. Typus in H. L. B. sub. no. 912.180—535.

Vellozia annulata GOETH. et HENR. nov. spec. — Arbusecula parva. Caudex erectus, brevis, furcatus, trigono-rotundatus, 9 mm diametens. Tunicae amplectantes, in series fere verticales ordinatae, arcuatis adpressae; eae caudicis apice late rotundatae, emarginatae, inter se 5 mm distantes, dorso fusco-cinereae, sulcatae, inter sulcis squamulis brevibus, subadpressis, distantibus praeditae; eae ramorum foliiferum formae similes, sed apice emarginato rudimentis duobus brevibus revolutis folii delapsi praeditae, (quae rudimenta annulorum ad instar caudicem circumcludunt), dorso pilis albidis, longiusculis, subadpressis cinereae. Folia in apice ramorum ad 12 conferta, erecto-patentia, subcanaliculata, rigida, lineariter, in apicem angustam sed rotundatam sensim angustata, ad 10 cm longa,

8 mm lata, margine subrevoluta haud serrata, ad basin pilis longis cinereis instructa, carina filiformis rotundata, supra glabra, subtus sulcata et squamulis griseis apice in pilos solutis in series plus minusve evidenter obliquas ordinatas dispositis. Flores per rosulam solitarii, albi. Pedunculus longitudine foliorum, trigonus, superne glandulis breviter stipitatis asper. Ovarium oblongum, 6 mm longum, 4 mm diametiens, dense glandulosum. Perigonii tubus cylindricus, 60 mm longus, $1\frac{1}{2}$ mm diametiens, glandulosus. Perigonii limbus infundibuliformis, laciniis ovato-lanceolatis, acutis, acuminatis, 40 mm longis, 6 mm latis. Stamina ad 18 in fauce tubi oriunda, filamentis in tubum longe decurrentibus, partibus liberis brevibus. Antherae filiformes, ad 7 mm longae, quam filamenta multo longiores. Stylus filiformis, stamina superans, in perigonio inclusus. Stigma trilobo-peltatum. Capsulae ignotae.

Brasilia: leg. GLAZIOU, Cachoeira da Vargem Grande, entre les rochers. 4 janv. 1895. no. 22212.; Serra dos Veiadadoes (Goyaz) entre les rochers. 6 janv. 1895. no. 22217. Typus in H. L. B. sub no. 912. 180—540.

Imago fotogr.: H. L. B. no. 93.

Vellozia barbata GOETH. et HENR. nov. spec. — Suffrutex erectus, plus quam 40 cm altus, circ. trifurcatus. Rami erecti, teres, circ. 5 mm crassi, tunicis arcte adpressis, ovalibus, apice late truncatis, sulcatis, atris, margine setis circ. 5 mm longis, horizontalibus, purpurascentibus, serius glabris, tecti; vertice subrosulato foliati. Folia numerosa (ad 10), subulato-linearum ($1\frac{1}{2}$ mm lat., 6 cm long.), superne triquetra, sicca complicata, dorso obsolete carinata, striata, margine setis patentibus albo-purpurascentibus, inferne ad 5 mm longis apicem versus gradatim se minuentibus, brevissime acuminata, apice anguste rotundata. Flores ignoti. Capsulae pedunculatae, pseudo-terminales, folia aequantes. Pedunculus crassiusculus teretiusculus, sulcatus, glandulis stipitatis obsitus. Capsula globosa glandulis stipitatis densiuscule obsita, rudimentis triangularibus tepalorum coronata.

Brasilia: Diamantina, dans le Campo pierreux de Minas, 11 avril 1892. Arbuste, fleurs blanches. GLAZIOU 19942. Typus in H. L. B. sub no. 912. 180—547.

Adnotatio. Habitus et characteres plurimi subgeneris *Xerophytæ*, sed quia rudimenta 12 vel 18 staminum videre censeo, in hac sectione posita.

Imago fotogr.: H. L. B. no. 54.

Vellozia cana GOETH. et HENR. nov. spec. — Caudex brevissimus, simplex vel furcatus, incrassatus. Tunicae valde aetatae, tenues, apice late rotundatae, dorso costis validis, remotiusculis applanatis percursae, castaneae; pilis longis, fasciculatis, subadpressis, dense albo-tomentosae praeditae. Folia ad 7 rosulata, 20—35 cm longa, circ. 10 mm lata, linearia, a medio fere in acumen longum, filiforme sensim angustata; margine revoluta, haud serrata; subtus sulcata, supra excavato-punctata, utrinque paleis liguliformibus, apicem versus in pilos singulos, plus minusve numerosis dissolutis, patentissimis vel reflexis, praesertim in facie inferiore et basin versus canescentia. Flores ad 1—2 per rosulam foliorum, albi? vel coerulei? Pedunculus foliis circ. duplo brevior, trigonus, sulcatus, in parte superiore glandulis parvis, breviter stipitatis, nigris praeditus. Ovarium rotundato-trigonum, ovatum, ad 7 mm longum, 3 mm diametens, glandulis breviter stipitatis, peltatis, aequilongis, confertis indutum. Perigonii tubus cylindricus, ad 6.5 cm longus, 2½ mm diametens, glandulosus. Perigonii limbus infundibuliformis, laciniis lanceolatis, exterioribus angustioribus, acutiusculis, subacuminatis, extus in parte mediana glandulosis, ad 7 cm longis, usque ad 12 mm latis. Stamina 18, in fauce tubi inserta, filamentis brevibus (circ. 3 mm longis) tubo adnatis longe decurrentibus. Antherae linearis, ad 8 mm longae. Stylus validiusculus, trigonus, stamina longe excedens. Stigma late trilobopeltatum. Capsulae ignotae.

Brasilia: (prov. Goyaz) leg. GLAZIOU no. 22219. Paranana entre les rochers, 12 févr. 1895. Typus in H. L. B. sub no. 912.180—521.

Imago fotogr.: Herb. Lugd. Bat. no. 92.

Vellozia circinans GOETH. et HENR. nov. spec. — Suffrutex medioeris (prob. usque ad 60 cm altus). Caudex erectus, indivisus v. furcatus, brevis (circ. 10—25 cm altus), circ. 2—2½ cm crassus, dense fibroso-tunicatus. Tunicae ovaes fuscae, in parte superiore fibroso-laceratae, fibris validis circinatis praeditae, dorso rotundatae, pseudo-plicatae costis remotis. Folia in apice caudicis ad 6 fere rosulata, erecta, paullo curvata, linearia, cuspidata, sub-canaliculata, acutiuscule carinata, margine, carinaque densiuscule adpresse serrato-spinulosa, usque ad 40 cm longa, 6 mm lata, irregulariter secedentia. Flores speciosi, campanulati, pseudo-terminales, solitarii, foliis breviores; pedunculus erectus, infra apicem sub-curvatus, validiusculus, trigonus, sulcatus, glaber, saepissime lutescens, interdum dilute atro-violaceus, usque ad 20 cm longus; ovarium clavato-cylindricum, truncatum, dense paleaceum; paleae sordide luteae, subadpressae, lineares v. lanceolatae; tepala lanceolata, acuta, v. rotun-

dato-apiculata, circ. 7—9 cm longa, 12 mm lata, pallide coerulea; stamina erecta, (24 numeravi), linearia dimidiis tepalis subbreviora, filamentis quam antheris brevioribus. Stylus validiusculus, apice curvatus, stamina superans. Stigma late trilobo-peltatum. Capsula ignota.

Brasilia: Serra de São João dt. El Rei, entre les rochers (Minas) 24 oct. 1887. Plante prèsqu'acaule. Fl. bleues. GLAZIOU no. 17291. Typus in H. L. B. sub no. 912.180—530; Pico da Sander aut Pico du Suspiro sine floribus, 11 août 1881. (GLAZIOU no. 13268 in H. L. B. sub no. 912.180—528; CLAUSSEN 27 (no. 20) in campis siccis Cachoeira do campo sine flore (Hb. Delessert, Hb. Paris); LANGSDORFF, Serra da Lapa (ex herb. Fischer no. 1052 Leningrad); RIEDEL; LANGSDORFF 2830 (herb. Leningrad).

Vellozia crassirama GOETH. et HENR. nov. spec. — Suffrutex mediocris, ramis (e descriptione Glaziovii) crassis. Caudex tunicaeque non visi. Folia rosulata, ad 10, late triangulari-linearia, 30 cm longa, 15 mm lata, sordide griseo-viridia, breviuscule acuminata, plana, apicem versus sub-bicarinata, subtus evidenter sulcata, margine carinaeque dense serrulata, supra valde aspera, interiora, erecta vel erecto-patentia, breviora, exteriora patentissima. Flores ad 3—8 per rosulam, speciosi, coerulei. Pedunculi filiformes, triquetri, foliis plus quam triplo breviores, glabri. Ovarium oblongo-clavatum, apice truncate, triquetrum, vernicosum. Tepala oblonga vel oblongo-lanceolata, obtusiuscula vel obtusa, breve mucronulata, circ. 5 cm longa, erecto-patentia. Stamina numerosa, linearia, tepalis plus quam 2-plo breviora, filamentis brevibus. Stylus filiformis, staminibus $\frac{1}{4}$ parte longior. Stigma late trilobo-peltatum. Capsula ignota.

Brasilia: Rio Forto dans le campo au Retiro (Goyaz) 12 fév. 1895. Arbuste, fl. bleues. GLAZIOU no. 22210. Typus in H. L. B. sub no. 912.180—538.

Vellozia crinita GOETH. et HENR. nov. spec. — Suffrutex humilis. Caudex brevissimus, incrassatus, ovoideus, dense adpresseque tunicatus. Tunicae valde auctae, late ovales, apice rotundato in fibros curvatos fissae, atro-fuscae, sulcatae. Folia subrosulata, ad 6 per rosulam, erecto-patentia, exteriora marcescentia reflexa; omnia curvata, canaliculata vel subcomplicata, linearia a medio fere sensim attenuata, anguste carinata, utrinque sulcata, margine carinaeque densiuscule adpresse serrata; serraturis in pilos longos, albidos, apicem folii versus gradatim breviores, abeuntibus; apice angustissime rotundata, 20 cm longa, 5 mm lata.

Flores pseudoterminalis, solitarii, pedunculati, medioeres, lilacini. Pedunculi filiformes, trigoni, inferne glabri, a medio fere muricibus brevibus, anguste linearibus, applanatis, apice acutis, plus minusve tortuosis, quorum basales minuti, superiores gradatim longiores sunt, obsiti. Ovarium obovatum, apice truncatum, paleis, iis pedunculi similibus, sed multo longioribus, usque ad 4 mm longis, dense praeditum. Tepala oblonga vel obovata, circ. 35—50 mm longa, 10—15 mm lata, apice obtusa, mucronulata. Stamina circ. 15, tepalis $2\frac{1}{2}$ -plo breviora. Antherae lineares, filamentis filiformibus 3-plo longiores. Stylus staminibus circ. $1\frac{1}{2}$ -plo longior. Stigma late trilobo-peltatum. Capsula ignota.

Brasilia: Sommet de la Serra de São José d'El Rey, sur les rochers. 15 déc. 1886. Fleurs lilas. GLAZIOU no. 16388. Typus in H. L. B. sub no. 912.180—543.

Vellozia declinans GOETH. et HENR. nov. spec. — Caudex dichotomoramosus, ca. 25 cm altus, 0.5 cm crassus, vaginis griseo-fuscis arcte adpressis, spiraliter dispositis obtectus. Folia summa in parte ramorum conferta, erecta, acerosa, glauca, subcanaliculata, linearia, superne paullo angustata apice rotundata obliqua emarginata, margine carinaeque aculeolato-serrulata. Vaginae quam folia latiores apice late truncato, superiores margine serrata, mox laeves, dorso rotundatae, valleculis angustissimis costisque satis latis subcanaliculatis percursae. Flores quasi terminales, pedunculo quam foliis brevioribus. Tepala lineari-lanceolata apiculata coerulea erecto-patentia 2 cm longa; stamina 18 tepala aequantia, antheris linearibus flavis quam filamentis longioribus. Stylus filiformis stigmatem peltato, stamina superans. Germen obeonicum elongatum obtuse trigonum aequaliter minute verrucosum. Capsulae laterales obeonicae trigonae vel \pm rotundatae tenuiter verruculosae, fuscae, stylo basibusque triangularibus acutis tepalorum coronatae, declinatae.

Brasilia: LANGSDORFF 1655 e. p. In saxosis Serra d. Lapa Nov. 1824 (Herb. Leningrad). Typus in H. L. B. sub no. 937.47—320.

Imago fotogr.: Herb. Lugd. Bat. no. 44.

Vellozia echinata GOETH. et HENR. nov. spec. — Suffrutex habitu ignoti. Rami ad 2 cm crassi, dense adpresse tunicati; tunicae auctae, brunneae dorso valide costatae, costis fere quadratis, superne in fibris validis solutae, fibri in tunicis summis circumscripti. Folia ad 6 in apice ramorum sub-rosulata, erecto-patentia sordide viridia, linearia longiuscule cuspidata, canaliculata, margine subrevoluta, acute carinata, margine carinaeque spinulosa-serrata, circ. 20 cm longa, 6 mm lata. Flores ignoti.

Capsulae folia reparties pseudoterminalibus et laterales, solitariae; pedunculatae erectae, apice versus tunicis trigonis, solutis, interne glabra a medio pedunculo glandulis brevibus apicatis obsitae, primo brevissimis remotissimae, deinde apicem versus glandulae longioribus et densius positis et in multitudine capsulae atropae immixtae. Capsula oblonga, straminea, basibus rotundatae persistentibus, lanceolatis, erectis, coronata, dense ciliolata, nervibus fusciscentibus + basibus incrassatis confluentibus, subulatis, glandularibus acuto-patentibus, basilibus reflexis, ad 2 mm longis, multo minoribus intermixtis.

Brasilia: Canaga entre las piedras (Minas), 18 fév. 1884 GLAZIOU no 1504. Petal. blancha, fl. blanche. Vég. Capita chetres. Typus in H. L. B. sub no. 912.180—542. SULLO 1328 (Hb. Leningrad. Brox. Berol.). A St. Helena (sua sumera) Hb. Paris.

Imag. photogr.: Herb. Lugd. Bat. no. 19, 20, 21.

Vellozia exilis GOURN. et HAWK. nov. spec. — Suffrutex erectus, parvus circ. 30 cm altus. Caulis erectus, tenuis (circ. 2 mm crassus) teres, prope basin jam parva decubante ramosus, tunicis lineari-lanceolatis, acute adpressis griseo-fuscae longioribus valde remotis tectus. Rami caudice similes, erecti, apicem versus folia pauca patentia gerentes. Tunicae lineari-lanceolatae anguste solutae brunneae, apicem versus emicrassantes, mox griseo-fuscae, dorso rotundatae, haud carinatae, apice late truncatae, margine fibris tenuibus ramo amplexentibus emittentes. Folia: vaginae adpressae, laminae patentes, lineares, breviter acuminatae, involutae, sulcatae, margine nervo mediano serratae, aculeolatae, apice rotundatae, nervo mediano utraque late alato, partes laterales involutae; folia ad 10 cm longa. Flores ignoti, breviter pedunculati. Capsulae ovals, pseudoterminalis, obsolete trigonae, 1 cm longae, 6 mm crassae, muricibus triangulari-linearibus, acutis, longiusculis, subadpressis, fusciscentibus, luteis, dense obsitae, pedunculi breviter, sulcati muricis tenuibus, rectis, breviusculis, paullo reflexis, densiusculis induti.

Brasilia: GLAZIOU 22220 — Chapadão dos Viadaira (Goyaz) 9 janv. 1890. Fleurs blanches. Typus in H. L. B. sub no. 912.180—539.

Imag. photogr.: Herb. Lugd. Bat. no. 33.

Vellozia fibrosa GOURN. et HAWK. nov. spec. — Frutex caudice crassiusculo (= 2 cm) vaginis acute adpressis griseis apice in fibris solidis curvatis solutis, tectus. Folia in apice ramorum ad 10, rosulata, glauca, plana, erecta prope apicem linearizata, lineari-triangularia, apice obtusa emarginata, margine carinaeque in summa parte spinuloso-scabra cetera

laevia. Flores 3—4 per rosulam. Tepala lanceolata, acuta, coerulea, erecto-patentia, ad 3 cm longa. Stamina numerosa tepalis dimidio breviora, antheris linearibus (flavis?). Stylus antheras multo superans crassiusculus. Stigma peltatum. Germen oboconicum triquetrum nitens, lutescens, in basi angulorum interdum scabriusculum. Scapi triangulares in summa parte nonnumquam scabriusculi. Capsula oboconica triquetra lutescens nitens, infra tepalorum rudimenta et interdum in ima basi angulorum scabriuscula.

Brasilia: GLAZIOU 19936! Biribiry au Mocoto près de Diamantina dans le campo (Minas) 30 mars 1892. Arbuste de fl. bleues. Vulg. Casella d'Ema. Typus in H. L. B. sub no. 912.180—531.

Imag. fotogr.: Herb. Lugd. Bat. no. 50.

Vellozia fimbriata GOETH. et HENR. nov. spec. — Suffrutex probabiliter robustus. Caudex ramique ignoti. Tunicae superiores (quae tantum adsunt) valde auctae, ovales, apice late truncatae, breviuscule fibrosae, sublignosae, margine late scariosae, fuscae, nitentes, plicatae, dorso planae. Folia in summitates ramorum ad 7 sub-rosulata secedentia, plana, subcanaliculata, linearia, longe et tenuissime acuminata, circ. 40 cm longa, 1 cm lata, margine pilis albidis, superne breviusculis adpressis, basin versus gradatim longioribus minus adpressis, in parte basali circ. 5 mm longis, erecto-patentibus, dense obsitis; supra glabra, juniora glutinosa, subtus carinata, breviuscule densissime crispo-tomentosa. Flores ad 3 per rosulam, subspeciosi, pseudo-terminales; pedunculus gracilis ad 30 cm longus, trigonus, sulcatus, inferne glaber, superne minute glanduloso-asper, glandulis brevissimis, inferne sparsis, apicem versus densius dispositis; ovarium oblongum glandulis brevissimis dense obsitum, apice planum sub-5-gonum cinereo-flavum; tepala erecto-patentia, coerulea, lanceolata; tria exteriora parum latiora et paullo longiora, anguste acuminata, apice subinflexa, circ. 5.5 cm longa, 1 cm lata, tria interiora obtusa, fere 8 mm lata; stamina ad 15 in fasciculos 6, basi attenuata tepalorum adnata, $\frac{1}{2}$ longitudinem tepalorum aequantia, filamentis quam antheris multo brevioribus. Stylus filiformis, staminibus multo longior, apice curvato. Stigma late trilobo-peltatum. Capsula ignota.

Brasilia: leg. LANGSDORFF, in Serra da Lapa; unicum e herb. Fischer (Leningrad).

Vellozia Gardneri GOETH. et HENR. nov. spec. — Omnibus characteribus *V. glauca* simillima, differt tamen notis sequentibus. Folia marginata, valleculis fere deficientibus, subtus inter nervos saepissime costis

tenuibus stomatiferis pereursa. Flores ad 3 per rosulam. Ovarium muricibus lineari-subulatis, apice indiviso vel breviter bicuspidato. Tepala lineari-lanceolata. Stamina dimidia tepala superantia.

Brasilia: Prov. Goyaz. GARDNER no. 4018. Typus in Hb. Vindob. etiam in Hb. Paris. Berol. et Delessert.

Vellozia glandulifera GOETH. et HENR. nov. spec. — Suffrutex humilis. Caudex brevis, parum incrassatus, circ. 7 cm longus, 12 mm crassus, dense imbricatum tunicatus. Tunicae valde auctae, oblongae, margine scariosae, apice truncato breviter recurvato, dorso rotundatae sulcatae, atro-fuscae. Folia in apice caudicis ad 10 subrosulata, exteriora patentissima, sequentia gradatim minus patentia, interiora erecta, omnia secedentia, linearia, apicem versus sensim attenuata, obtusa, apice latiuscula, margine integra, revoluta, dorso carinata, subtus breviter densissime griseo-villosa, supra glabra, circ. 12 cm longa, 5 mm lata. Flores mediores, pseudoterminales, solitarii, violacei, folia superantes. Pedunculi filiformes, erecti vel leviter curvati, trigoni, sulcati, inferne glabri, ceterum glanduloso-pilosi; pili crebri, inferiores brevissimi, apicem versus gradatim longiores, graciles, rufescentes, in pilos ovarii abrupte transeuntes. Ovarium ovatum, pilis longis, rufescentibus, gracilibus, glanduliferis, dense obsitum. Tepala obovato-oblonga, obtusa erecta. Stamina circ. 15, linearia, tepalis duplo breviora. Filamenta antheris circ. 4-plo breviora. Stylus filiformis, tepalis quarta parte brevior. Stigma trilobo-peltatum. Capsula ignota.

Brasilia: DE LANGSDORFF, in arenosis graminosis pr. Cachoeira. Herb. Fischer 1418. Typus in H. L. B. sub no. 937.47—321.

Vellozia Glaziovii GOETH. et HENR. nov. spec. — Caudex humilis ad 12 cm altus, fusiformis ad 2½ cm crassus, saepe divisus, dense adpresse tunicatus, superne folia pauca (ad 5) subrosulata gerens. Tunicae late ovatae, apice truncatae, fuscae, v. cinnamomeae, vestustiores valde auctae, nitentes, v. parenchymate evanescenti, e nervis validis longitudinalibus remotis transverse reticulatim connexis compositae. Folia secedentia, linearia, longe acuminata, apice angustissime rotundata, erecta v. erectopatentia, subtus sulcata plana v. (sicca) saepe complicata; carina tenui rotundata, margine haud incrassata, in parte superiore carinae remote adpresse aculeolata, ad 30 cm longa. Flores speciosi, coerulei, pseudoterminales, solitarii, pedunculati; pedunculus acute trigonus, sulcatus, inferne glaber, apicem versus muricibus gradatim longioribus et numerosioribus, in illis ovarii transeuntibus, asper, ad 6 cm longus. Ovarium

breve subtrigono-cylindricum, basi rotundatum, apice truncatum dense muricatum muricibus subadpressis, subtortuosis, subulatis, stramineis. Tepala lanceolata, acuta, erecta, circ. 7 cm longa, $1\frac{1}{2}$ cm lata. Stamina ad 15, linearia, filamentis quam antheris multo brevioribus, tepalis 2-plo breviora, in fasciculos per 2, 3 v. 4 connata. Stylus trigonus validiusculus, stamina superans. Stigma trilobo-peltatum. Capsulae ignotae.

Brasilia: GLAZIOU 22214. Serra dos Veadeiros. près du Ponso dans le campo (Goyaz) 6 janv. 1895. Plante naine, fleurs bleues. Typus in H. L. B. sub no. 912.180—523; id. no. 931.107—45.

Imag. fotogr.: Herb. Lugd. Bat. no. 32.

Vellozia granulata GOETH. et HENR. nov. spec. — Suffrutex parvus. Caudex digitalis, brevis, erectus?, squamis in fibris apice circinnatis solutis tectus. Folia ad 6 in apice caudicis rosulata, linearia erecto-patentia, curvata, rigida, obsolete tricarinata, complicata tota margine et superne in parte carinarum, spinuloso-serrata, subtus obsolete valleculata, vaginis elongatis, linea transversali arcuata articulatis, ad 7 mm lata, 17 cm longa. Squamae juniores truncatae, emarginatae, striatae mox in fibris numerosis, apice circinnatis solutis. Flores pseudo-terminales, solitarii, pedunculo triquetro, sulcato, punctulis elevatis scabriusculo. Tepala oblongo-lanceolata, acuminata, ca. 10 mm longa. Stamina tepalis breviora, numerosa, antheris linearibus flavis, quam filamentis longioribus. Stylus filiformis triqueter, stamina superans, stigma peltatum, trilobum. Germen trigonum oblongo-clavatum, apice constrictum, punctulis minutis hyalinis granulatum. Capsula erecta, oblonga, apice oblique truncata, dentibus obscuris, basi rotundata, brunneo-lutescens, minute granulata.

Brasilia: Diamantina, au Curalinho, dans le campo (Meinos) 14 avril 1892. GLAZIOU no. 19934! Typus in H. L. B. sub no. 912.180—544; SCHWACKE 8361. Biribing pr. Diamantina Mart. '92.

Imag. fotogr.: Herb. Lugd. Bat. no. 42.

Vellozia grisea GOETH. et HENR. nov. spec. — Frutex parvus usque ad 40 cm altus. Caudex adscendens v. erectus circ. 30 cm altus, $1\frac{1}{2}$ cm crassus, inferne teretiusculus superne obtuse trigonus, indivisus v. parce furcatus, tunicis arete adpressis remotiusculis, griseis, in parte basilari caudicis in fibris fuseis solutis, tectus, in summitate subrosulato-foliatus. Tunicae sublignosae ovatae, apice late truncatae, cinerascens, inferne fuscae, dorso obtusissime carinatae, costatae; costae proximae, lateraliter appendicibus ad tunicam adpressis, deplanato-spinuliformibus notatae, appendices fere totam valleculam obtegent. Folia secedentia ad 5 per

rosulam erecto-patentia v. patentia, dimensionibus valde variis, 8 usque ad 28 cm longa, 3 usque ad 10 mm lata, plana, linearia, longiusecule angustata, tenuiter rotundato-carinata, margine carinaque spinuloso-serrata, apice anguste rotundata v. obtusa, in dorso sulcato, paleis adpressis, vertice fimbriato-pilosis induta. Flores pseudoterminales, 1—2 per rosulam, breviuscule pedunculati (in specimina omnia valde deteriorata) probabiliter speciosi; pedunculus circ. 5 cm longus, 1 mm latus, trigonus, striatus haud incrassatus, muricibus tenuibus breviusculis, subadpressis notatus; ovarium ovale, rotundato-trigonum, muricibus patentibus in parte basilari incrassatis, apicem versus attenuatis, partim bicuspidatis, subtortuosis partim glochidiatis, densissime obsitum; tepala lineari-lanceolata ad 7 cm longa, in specimina herbariorum omnia valde deteriorata. Stamina circ. 18, linearia antheris quam filamentis longioribus, dimidiis tepalis fere arquilonga. Stylus validus, trigonus, stamina superans. Stigma late trilobo-peltatum. Capsula ignota.

Brasilia: WEDDELL, inter Goyaz et Cujaba (Herb. Paris).

Imag. fotogr.: Herb. Lugd. Bat. no. 23.

Vellozia hirsuta GOETH. et HENR. nov. spec. — Suffrutex parvus. Folia in summa parte ramorum conferta, ad 25 cm longa, circ. 8 mm lata, linearia, a medio fere sensim in acumen filiformem angustata, subtus sulcata, carina lata, rotundata pereursa, margine revoluta; praesertim in facie inferiore et basin versus pilis applanatis, longis, patentibus, albidis hirsuta; in facie superiore breviuscule adpresse pilosa. Flores ignoti. Species valde peculiaris, pilis lanceolatis gilvescentibus, nitentibus, insignis.

Brasilia: leg. GLAZIOU no. 19924; Birybiry près de Diamantina dans le Campo (Minas) 24 mars 1892. Plante naine, sans fleurs. Typus in H. L. B. sub no. 912.180—558.

Imag. fotogr.: Herb. Lugd. Bat. no. 96.

Vellozia leptopetala GOETH. et HENR. nov. spec. — Suffrutex erectus, parvus \pm 20 cm altus. Caudex indivisus vel dichotomus ad 4 cm crassus, vaginis truncatis sulcatis, fuseis nitentibus apice albescens, arcte adpressis, tectus. Folia summa in parte caudicis spiraliter ordinata numerosa, erecta, glauca, linearia, longitudine et latitudine variac, 3.5 usque ad 11 cm longa 0.2 cm lata, apicem versus sensim angustata, subtricarinata, margine et superne in parte carinarum aculeolato-serrata, apice truncata, obliqua, emarginata, linea transversa cum vagina articulata, striata. Flores quasi terminales saepissime solitarii folia superantes,

medioeres, scapus florigerus usque ad 7 cm longus, profunde sulcatus, pilis brevibus patentibus apice inflatis (an glanduliferis?) asper. Germen ovatum sub orificio constrictum pilis (ut in scapo) asperum. Tepala lineari-spathulata, reflexa pallide-coerulea. Stamina 18, erecta, antheris linearibus flavis filamentis paullo brevioribus. Stylus filamentis longe superans apice incrassatus. Stigma peltatum. Capsulae maturae laterales, deinde sub folia insertae, griseo-fuscae, opacae vel nitentes, verruculosae, asperae, oblongae sub orificio paullo constrictae, basibus triangularibus acutis apice recurvatis tepalorum et stylo persistente coronatae. Scapus fructiferus profunde sulcatus, nigrescens, demum patens.

Brasilia: Minas Geraes. GARDNER 5230!; LANGSDORFF, S. da Lapa! Typus in H. L. B. sub no. 937.47—365; Birybiry bei Diamantina auf Felsen. SCHWACKE 8352!, 8354! (fructifera!); Rio Janeiro, GLAZIOU 13266! (fructifera); Minas Geraes, ST. HILAIRE!

Imag. fotogr.: Herb. Lugd. Bat. no. 26, 27.

Vellozia leucanthos GOETH. et HENR. nov. spec. — Suffrutex humilis. Caudex brevis, furcatus. Rami erecti, saepe numerosi, dense conferti, ut caudex adpresse tunicati. Tunicae fusco-griseae, opacae, dorso costis remotis, applanatis percursae, mox in fibris validiuseculis, paullo curvatis fissae. Folia in apice ramorum subrosulata, omnia vel exteriora tantum patentissima vel reflexa, juniora patentia et erecto-patentia, (folia floralia erecta), curvata, resinosa, canaliculata, linearia, ad 13 cm longa, 4 mm lata, acuta, apice angustissime rotundata, margine incrassata; subtus sulcata, pilis albis longiuseculis, subadpressis praedita, serius glabrescentia, carina rotundata; supra glabra. Flores in apice ramorum solitarii, pedunculati, albi, in speciminibus a me visis omnes valde deteriorati. Pedunculus validiuseculus, trigonus, sulcatus, in parte superiore glandulis, parvis, breviter stipitatis, sparsis praeditus, usque ad 80 mm longus. Ovarium oblongum, muricibus breviuseculis, teretibus, apice glanduliferis, patentibus densissime obsitum. Perigonii tubus cylindricus, plus quam 50 mm longus, glandulis breviter stipitatis, sparsis asper. Cetera ignota.

Brasilia: GLAZIOU no. 15674. Serra do Ificionado près de Caraça, dans le Campo. (Minas) 10 juli 1883. Typus in H. L. B. sub no. 937.79—82.

Imag. fotogr.: Herb. Lugd. Bat. no. 88.

Vellozia maculata GOETH. et HENR. nov. spec. — Arbuscula parva (ramosa?). Caudex non vidi. Rami teretiuseculi, ad 10 mm crassi, tunicis

arete adpressis imbricatis tecti. Tunicae inter se ad 4 mm distantes, apice late truncatae, paullo emarginatae, in junioribus rudimenta dua revoluta folii delapsi gerentia, dorso atro-fuscae, subnitentes, remotiuscule costatae. Folia haud rosulata, in summa parte ramorum conferta, numerosa, anguste-linearia, circ. 20 cm longa, 7 mm lata, a medio fere sensim in acumen longum, tenuissimum angustata, canaliculata; margine (sicca) revoluta, obsolete distanter serrulata, in serraturis squamulis adpressis, parvis, acutis praedita, ima basi laminae pilis nonnullis longiusculis ciliata; supra laevia, subtus sulcata, carinata, in parte vaginantia maculam fusco-atram, apice cordatam praebentia; carina rotundata, dorso squamulis parvis, subadpressis, lanceolatis, acutis, binis vel ternis, densiuscule regulariter dispositis praedita. Flores terminales, solitarii, folia superantes, albi. Pedunculus in tertia parte superiore grandulis stipitatis, parvis asper. Ovarium rotundato-trigonum, oblongum, densissime breviter glandulosum, 10 mm longum, 5 mm latum. Perigonii tubus tenuis, cylindricus, 7 cm longus, $1\frac{1}{2}$ mm crassus, dense glandulosus. Perigonii limbus infundibuliformis, circ. 5 cm amplus, segmentis ovato-lanceolatis, 6 cm longis, 15 mm latis, acutis, breviter mucronatis. Stamina 18, in tubi faucibus inserta; filamenta brevissima, in tubum longe adnato-decurrentia; antherae lineares, ad 2 cm longae. Stylus validiusculus, trigonus, stamina longe superans, in perigonio inclusus. Stigma late peltatum trilobum. Capsulae ignotae.

Brasilia: leg. GLAZIOU no. 22218a Cachoeiras da Vargem Grande de la Serra da Balisa. 5 janv. 1895. (Herb. Paris).

Imag. fotogr.: Herb. Lugd. Bat. no. 87, 90.

Vellozia Martiana GOETH. et HENR. nov. spec. — Suffrutex robustior, circ. 6—9 dm altus, dichotome ramosus. Rami crassi circ. 2 cm diam.; vaginae in series tres obliquas dispositi, cinerascetes, rectangulares, fissae, mox laceratae et in fibris solutae; partes liberae paullulo divergentes, apice leviter incurvatae. Folia numerosa fere rosulata, sicca saepissime complicata, erecta triangulari-linearia, apice angustissime rotundata, saepissime haud emarginata, margine et in parte superiore carinae serrulata, prope basin linea transversa secedentia. Flores pseudo-terminales folia subaequant vel superantes, scapo crassiusculo, triquetro, sulcato, superne setis brevibus glanduliferis scabro. Germen ita ut capsula obovatum, truncatum, trigonum, basi praesertim ad angulos, interdum tota superficie setis glanduliferis brevissimis vel glandulis verrucosis, scabrum, griseo-fuscum, opacum, vel nitente-lutescens. Tepala erecto-patentia, lanceolata?, obtusa?, \pm 4 cm longa, coerulea. Stamina

30?, in phalanges sex basi squamulis laceris fultas ordinata, tepalis duplo breviora, antherae filamentis longiores.

Brasilia: MARTIUS, Herb. Flor. Bras. no. 725 (sub nom. *V. verruculosa* et *V. compacta*); RIEDEL no. 112 (Hb. Delessert) (Hb. Paris); CLAUSSEN Pico do Itabira do Campo (Hb. Delessert); GLAZIOU 17290. Serra do Itabira.

Ad *V. compactam* et *V. ambiguam* maxime accedit; differt a *V. compacta* staminibus 30, a *V. ambigua* tunicis laceris apice incurvatis.

Vellozia pilosa GOETH. et HENR. nov. spec. — Suffrutex parva, caespitosa. Caudex brevis, pluriceps, squamis in fibris solutis griseo-lutescentibus tectus; rami erecti. Folia membranacea, erecto-patentia, numerosa, exteriora patentia, subulato-lineararia, haud carinata, apice acutiuscula, tota superficie pilis albidis erecto-patentibus sparsis e tuberculo multiloculari oriundis induta, viscosa, minute striata usque ad 1.5 mm lata 40 mm longa, vetusta contorta, vagina striata, parce pilosa. Squamae mox calvescentes, laceratae, in fibris solutae, griseo-lutescentes. Scapi 1—2 per rosulam foliorum, laterali \pm arcuati, rufescentes, sulcati, filiformes, setis glanduliferis breviusculis brunneis obsiti, foliis paullo breviores. Flos parvus in scapo erectus. Tepala albida patentia. Stamina plura (18?), antheris linearibus filamentis brevibus. Stylus stigmaque non vidi. Germen ellipsoideum apice cylindraceum lutescens, nitens, setis glanduliferis sparsis obsitum. Capsula ut germen, apice dentes sex breves oblique truncati, erecti, gerens.

Brasilia: Dimantina, sur. les rochers (Minas) 16 avril 1892. Fleur blanchâtre. leg. GLAZIOU no. 19933. Typus in H. L. B. sub no. 912. 180—546.

Imag. fotogr.: Herb. Lugd. Bat. no. 16.

Vellozia pleurocarpa GOETH. et HENR. nov. spec. — Suffrutex parvus, circ. 14 cm altus, erectus, ramosissimus. Caudex brevis, saepissime a basi jam ramosus. Rami erecto-patentes, furcati, subarcuati, fere aequilongi, in summa parte tantum dense foliosi. Squamae arete adpressae, fuscae, sulcatae, ovato-lanceolatae, margine apicem versus aculeolatae, apice truncatae. Folia lineararia, erecta (humefacta tamen erecto-patentia), pungentia; vaginis fuscis, ovato-lanceolatis, sulcatis, margine apicem versus aculeolis nonnullis gerentibus; laminis (siccis) involutis, sulcatis, linea transversali secedentibus, margine remote aculeolatis, apice rotundatis. Flores pseudo-terminales, parvi, breviter pedunculati, folia aequantes, erecti, germen globoso-trigono, glandulis breve stipitatis obsito; tepalis lineari-

lanceolatis, acutis, dilute coeruleis, reflexis (an semper?); staminibus filiformibus, tepala fere aequantibus, stylo filiformi, elongato, stigmatе parvo, trilobo, peltato. Capsulae laterales, longe persistentes, erecto-patentes, mox horizontales, trigono-globosae v. subovatae, fusco-stramineae, obsolete 12-costatae, sparse glanduloso-asperae, pedunculo curvato, quam capsula circ. 2-plo longiore.

Brasilia: Biribiry, près Diamantina, dans le campo (Minas) 25 mars 1892. Fleur bleue pâle. GLAZIOU no. 19941. Typus in H. L. B. sub no. 912.180—526; SCHWACKE no. 8345! 8346! (Hb. Berol.).

Imag. fotogr.: Herb. Lugd. Bat. no. 7, 10.

Vellozia pumila GOETH. et HENR. nov. spec. — Caudex brevis, fere ovalis, circ. 4 cm altus, $1\frac{1}{2}$ cm crassus, indivisus, dense adpresse tunicatus. Tunicae ovals, valde auctae, scariosae, nitente fuscae, costatae, costae in tunicis vetustioribus fibris numerosis ascendentibus connexae, serius in fibris solutae, apice truncatae, fibroso-fissae, fibris apice saepius curvatis. Folia secedentia? plana v. sicca subcomplicata, patentia v. erecto-patentia, brevius acuminata, dorso sulcata, nervo medio tenui, rotundato, carinata, margine incrassata carinaque densiuscule aculeolata, aculeolis erecto-patentibus, apice angusta, obtusa. Flores subspeciosi, coerulei, pseudoterminales, solitarii, pedunculati; pedunculus foliis multo brevior, circ. $1\frac{1}{2}$ — $2\frac{1}{2}$ cm longus, tenuis, trigonus, sulcatus, inferne glaber, superne pilis brevibus patentibus scaber. Ovarium breve subtrigono-cylindricum, basi rotundatum, apice truncatum, dense muricatum, muricibus subadpressis, subulatis, subtortuosis, stramineis. Tepala lanceolata acuta, erecta, circ. 4 cm longa. Stamina ad 15, irregulariter fasciculata, tepalis circ. 2-plo breviora filamentis quam antheris multo brevioribus. Stylus trigonus, validiusculus, stamina superans. Stigma trilobo-peltatum.

Brasilia: GLAZIOU 22215, Ponte Alta près de la cascade dans les camops. 28 sept. 1894. Typus in H. L. B. sub no. 912.180—522. id. sub no. 931.107—55. Maxime accedit ad *V. Glaziovii*, diversa praesertim statura minore, foliis saepissime patentibus, marginatis, brevius acuminatis, densius serratis, pedunculis brevioribus minus muricatis, floribus minoribus.

Imag. fotogr.: Herb. Lugd. Bat. no. 28.

Vellozia rhynchocarpa GOETH. et HENR. nov. spec. — Rami crassi circ. 3 cm diametientes, rotundato-trigoni, furcati, apicem versus attenu-

ati. Tunicae fuscae, valde auctae, dense imbricatim dispositae, marginibus tenuibus arete adpressae, ita ut fines tunicarum invisibiles, apice late rotundatae, in tunicis nonnullis breviter recurvatae, dorso costis remotis, validiusculis, rotundatis et sulcis angustissimis alternantibus pereursae, glabrae. Folia ad 7—10, rosulata, circ. 44 cm longa, 8 mm lata, linearia, a medio sensim in acumen fere filiformi angustata, sicca margine subrevoluta, remote breviuscule spinulosa, carina filiformi, supra laevia, subtus sulcata denseque subadpresse fasciculatim villosa, serius glabrescentia. Flores ignoti. Capsulae pedunculatae, ad 1—3 per rosulam. Pedunculus ad 9 cm longus, validus, subtrigonus, inferne glaber, a medio fere glandulis breviter stipitatis apicem versus densissime positus, verrucosus. Capsulae oblongae, tricoecae, ut pedunculus glandulis stipitatis verrucosae, 22 mm longae, 13 mm crassae, apice rostro longo, subulato verrucoso (tubus perigonii induratus?) instructae.

Brasilia: Prov. S. Paulo inter Canna Verde et Cajuru ad Matto grosso in campo siccio petroso. leg. REGNELL. Feb. 1849 no. III 1241. Mus. Bot. Holm.

Imag. fotogr.: Herb. Lugd. Bat. no. 94.

Vellozia Riedeliana GOETH. et HENR. nov. spec. — Suffrutex, secundum adnotationes RIEDELI 15—33 cm altus. Caudex ramique ignoti. Tunicae (superiores tantum adsunt) ovoides; dorso crebre costatae, fuscae, nitentes, fissae, apice breviter recurvatae. Folia ad 5 rosulata; ad 25 cm longa, 4 mm lata, resinosa, linearia, in acumen fere filiformi gradatim angustata, sicca margine revoluta, incrassata, distanter serrato-setosa; carina anguste filiformi; subtus sulcata, subadpresse pilosa, pilis longiusculis sub lente subulatis, subramosis; supra fere glabra. Flores per rosulam solitarii, breviter pedunculati, albi. Pedunculis trigonus, striatus, ad 2 cm longus, glandulis breviter stipitatis asper. Ovarium fusiforme, 11 mm longum, 3 mm diametens, muricibus (glanduliferis?), erectopatentibus, quam ii pedunculi multo longioribus, densissime vestitum. Perigonii tubus ad 6.5 cm longus, glandulis breviter stipitatis dense obsitus; pars inferior angusta (ad 1 mm crassa), cylindrica, abrupte in partem superiorem, fere duplo crassiorem, subbreviorem, cylindricam abiens. Perigonii limbus tubuloso-infundibuliformis, segmentis lanceolatis, 5.5 mm longis, 1 cm latis (exterioribus tamen multo angustioribus), acutis, breviter acuminatis, extus in parte mediana glandulosus. Stamina 18, circiter in medio tubo inserta; filamentis tenuissimis, ad 2.5 cm longis; antheris linearibus, subaequilongis. Stylus filiformis, trigonus, inclusus, stamina superans. Stigma peltato-trilobum. Capsulae ignotae.

Brasilia: leg. RIEDEL in saxosis Serra da Lapa. Nov. 1824 no. 1051 Herb. Leningrad.

Imag. fotogr.: Herb. Lugd. Bat. no. 86, 91.

Vellozia scoparia GOETH. et HENR. nov. spec. — Suffrutex parvus, erectus, v. adscendens basi radicante. Caudex brevis, tenuis, teretiusculus, saepissime jam a basi ramosus. Rami elongati, graciles, teretiusculi, simplices v. furcati, in parte superiore tantum densiuscule foliati, squamis arete adpressis, fere rectangularibus, apice truncatis, sulcatis, brunneis, apice anguste albo-marginatis tecti. Folia erecto-patentia, vaginis brunneis, superne albescentibus, ovato-lanceolatis, margine integris; laminis linea transversa secedentibus, subulatis, sub-complicatis, (siccis) pungentibus, apice rotundatis v. truncatis, margine integris, valde glutinosis. Flores pseudo-terminales, erecti, pedunculati, folia aequantes, coerulei, pedunculo tenui, sub-trigono striato, glandulifero (circ. 1 cm longo), germine globoso-trigono, glandulis breve stipitatis, dense obsito, tepalis lanceolatis, acutis, erecto-patentibus, serius reflexis, ad 8 mm longis; staminibus dimidium tepalorum paullo superantibus, antheris linearibus filamentis filiformibus sublongioribus, stylo erecto, filiformi apice leviter curvato, stigmate trilobo, peltato. Capsulae terminales, serius laterales, erectae v. erecto-patentes, globoso- v. oblongo-trigonae, apice coarctatae stramineae, verrucoso-scabrae, pedunculis circ. 3-plo longioribus, filiformibus, sulcatis glanduloso-scabris.

Brasilia: In saxosis humidis pr. Parauna et Tejuco. LANGSDORFF in herb. Fischer 1417! In saxosis humidis pr. Cachoeira ibid. 1178!; GLAZIOU 19939! Typus in H. L. B. sub no. 912.180—552.

Imag. fotogr.: Herb. Lugd. Bat. no. 39.

Vellozia Seubertiana GOETH. et HENR. nov. spec. — (= *V. glauca* β *cujabensis* SEUB. in Fl. Bras. III. i. p. 79). Maxime accedit ad *V. glaucam*, differt characteribus sequentibus: Statura, caudex, rami, ignoti sed probabiliter *V. glauca* similes. Tunicae ut in *V. glauca* sed costis magis elevatis, appendicibus minus regulariter dispositis, subnitidis ita ut tunicae nitidae sunt. Folia lineari-lanceolata longe et anguste acuminata, marginata, margine serrato-spinulosa, carina acuta remotiuscule aculeolata, subtus sulcata, costis lateraliter parce minute aculeolatis, circ. 30 cm longa, $1\frac{1}{2}$ cm lata. Flores speciosi, pseudoternales, longe campanulati colore ignota; pedunculus brevis usque ad 7 cm longus, validus, trigonus, sulcatus, dense et breve muricato-asper; ovarium ovale, acutiuscule trigonum, muricibus breviusculis sub-5-gonis, sulcatis glochi-

diatis dense obsitum; tepala lanceolata-linearia (12 cm longa, 12 mm lata), rotundata basin versus attenuata; stamina, stylus et stigma ut in *V. glauca* (fide SEUBERT). Capsula elliptica rotundato-trigona, muricibus inter se adpressis patentibus, e basi sub-5-gona ovoidea, abrupte attenuatis, glochidiatis, fuscis.

Brasilia: Spec. auth. Seubertii: Matto-grosso LHOTZKY no. 90 (Hb. Vindob.); Exped. 1ma Regnellian. Phanerog. no. 1738e (in Hb. Stockholm) ad Buriti in Serra da Chapada, in „cerrado” leg. MALME; Matto-grosso eujabensis leg. MENSO et LHOTZKY no. 90 (Hb. Berol.).

Vellozia variegata GOETH. et HENR. nov. spec. — Suffrutex, erectus, pluries dichotome ramosus. Rami teretiusculi, vaginis spiraliter imbricatis dispositis, arete adpressis, trapezoideis, apice truncatis, sulcatis, niten- tibus, stramineis, in parte superiore distincte delineatis, albis, tecti; pars libera 1 cm, rami 6 mm crassi. Folia in summa parte ramorum nume- rosa, erecta, linearia, apicem versus sensim angustata carinata, in parte superiore tricarinata, apice oblique rotundata, emarginata, carina laevi, margine remotiuscule serrata summis carinis lateralibus aculeolato-serra- tis, circ. 3 mm lata, circ. 9 cm longa, linea transversali cum vagina articulata. Flores pedicellati pseudoterminales, in apice ramorum soli- tarii pedicello folia aequante v. paullo superante. Pedicellus triqueter pilis brevibus crassis glanduliferis sursum spectantibus asper. Germen ovoideum pilis brevibus glanduliferis nigrescentibus obsitum. Tepala oblonga, acuta, violacea 3 cm longa, erecto-patentia. Stamina probabiliter 15, erecta, antheris linealibus flavis, quam filamentis brevioribus. Stylus filiformis stamina superans. Stigma peltatum. Capsulae ellipsoideae, triquetrae in lateribus sulco profundo mediano praeditae, fusco-strami- neae, apice truncatae, pilis brevibus crassis glanduliferis asperae, tepa- lorum basibus persistentibus acuminatis coronatae. Pedicelli fructiferi quam folia breviores, crassi triquetri lateribus sulcatis superne pilis crassis brevibus asperi.

Brasilia: Rio de Janeiro. GLAZIOU no. 12221, Novo Friburgo, a la Pedra do Conego, 23 juin 1880. Petit buisson, fleurs violacées. Typus in H. L. B. sub no. 912.180—556 (fructifera); GLAZIOU no. 13266, Morro do Suspiro a Nova Friburgo sur les rochers (Rio Jan.) 4 sept. 1881. Fleurs violacées. H. L. B. sub no. 912.180—553; Felsengehänge der Pedra de Conico bei Nova Friburgo, 1400 m leg. E. ULE no. 4617! Specimina e herb. Dumortier in Herb. Brussel conservata florifera.

Nota. Sterilis v. fructifera habitu *V. gracili* et praesertim *V. leptopetalae* similis, a *V. gracili* tamen diversa pedicellis crassioribus multo

brevioribus, a *V. leptopetala* statura altiora ab duabus vaginis apice zona alba praeditis.

Imag. photogr.: Herb. Lugd. Bat. no. 47 et 141.

Vellozia velutinosa GOETH. et HENR. nov. spec. — Suffrutex parvus. Caudex indivisus, brevis, inerassatus, dense tunicatus. Tunicae valde auctae, confertae, apice latissime horizontaler truncateae; juniores rudimentis brevibus, recurvatis, foliorum delapsorum praeditae; dorso fusco-nigrescentes, breviuscule denseque cinereo-tomentosae, remotiuscule costatae, costis validis, dorso applanatis, squamulas brevissimas, erectas, remotas, gerentibus. Folia ad 7, rosulata, plana, subcanaliculata, linearia, apicem versus a medio sensim in acumen tenuem angustata; 20 cm longa, 8 mm lata; subtus sulcata, paleis erectis, anguste ligulaeformibus, apice in pilis solutis, prope basin sublongioribus quasi velutina, supra laevia, subadpresse densiuscule pilosa; margine tenui dense breviuscule paleaceo-pilosa, haud serrata. Flores solitarii, folia superantes, albi. Pedunculus validiusculus, trigonus, a medio fere glandulis parvis, breviter stipitatis, nigrescentibus, apicem versus confertis indutus; 15 cm longus. Ovarium subtrigonum, ovatum, 7 mm longum, 3 mm crassum, densissime breviter nigro-glandulosum. Perigonii tubus cylindricus, tenuis, ad 45 mm longus, 1½ mm crassus; glandulis breviter, basin tubi versus longius stipitatis dense obsitus. Perigonii limbus infundibuliformis, ad 3 cm longus, 3 cm amplus; laciniis lanceolatis, acutis, apice tenuiter acuminato-angustatis, circ. 4 cm longus, 6 mm latus, in parte mediana extus glandulosus. Stamina (in specimine investigata male conservata) 13, in fauce tubi inserta; filamenta brevissima, in tubum adnato-decurrentia; anthere lineares, circ. 10 mm longae. Stylus perigonii fere longitudine, validiusculus, trigonus. Stigma late trilobo-peltatum. Capsulae ignotae.

Brasília: leg. GLAZIOU no. 22218 Cabeceira du Rio Sta. Anna, 8 janv. 1895.

Imag. photogr.: Herb. Lugd. Bat. no. 89.

Vellozia virgata GOETH. et HENR. nov. spec. — Suffrutex parvis, erectus, saepe gregarius. Caudex simplex v. saepissime ramis fastigiatis, tenuis, teres. Rami (v. caudices indivisi) teretes, tenues, maxima parte dense foliati, cetera foliorum emortuorum tecti. Folia (sicca) erecta; vaginis adpressis, lanceolatis, haud articulatis, sulcatis, griseo-fuscis, margine distante aculeolatis, laminis haud secedentibus subulatis, pungentibus, involutis, sulcatis, margine spinuloso-serratis, apice truncateis

v. rotundatis. Flores parvi, laterales, erecti, pedunculati; pedunculo tenui, trigono, 6-costato, glandulis stipitatis parvis sparse obsito; germine oboeoneo-trigono, nitido, stramineo in aciebus et in medio lateribus costato, costis remote glanduloso-verrucosis; tepalis lanceolatis, acutis, pallide-coeruleis, staminibus linearibus, filamentis brevibus; stylus tenuis staminibus fere subaequilongus. Capsulae acute trigono-ovatae, stramineae, nitidae seriebus 6 glandularum verrucosarum ut in germine obsitae.

Brasília: Sao José d'El Rei, dans le campo pierreux (Minas) 20 janv. 1889. Fleur blanchâtre. GLAZIOU no. 17832. Typus in H. L. B. sub no. 912.180—550; Pico d'Itabira do Campo sur les roches (Minas), 12 sept. 1887, sans fleur. GLAZIOU no. 17292 in H. L. B. sub no. 912.180—549; WEDDELL 1404!; Pico d'Itabira, CLAUSSEN no. 198! (Hb. Mus. Paris).

Imag. fotogr.: Herb. Lugd. Bat. no. 5.

Vellozia Wettsteinii (GOETH. et HENR. nov. spec. — Suffrutex arbusculiformis, 2- vel 3-ceps. Caudex ignotus. Tunicae juniores oblongae, truncatae, nitenti-lutescentes, arcte adpressae, vetustiores desunt. Folia rosulata, numerosa (ad 30), plurima interiora erecto-patentia, exteriora nonnulla latiora, marcida, patentissima demum reflexa, triangulari-linearia, sulcata, apice angustissime rotundata vel acuta, pungentia, circ. 26 cm longa, usque ad 9 mm lata (exteriora tamen usque ad 15 mm lata), glaucescentia, plana, apicem versus bicarinata, carina angusta, margine subincrassata carinaque superne minute acuteque serrata. Flores speciosi, coerulei, ad 1—3 per rosulam, foliis subbreviores. Pedunculi filiformes, trigoni, fructiferi valde incrassati, glabri. Ovarium oblongum, apice coarctatum, nitens, lutescens, trigonum, glabrum, in angulis interdum verrucis paucis remotis notatum. Tepala obovato-lanceolata, erecta vel erecto-patentia, basi angustata, apice obtusa, sub-mucronulata. Stamina in flore singulo a me dissecto ad 25, tepalis fere triplo breviora. Filamenta antheris breviora. Stylus filiformis, trigonus. Stigma late trilobopeltatum. Capsula ignota.

Brasília: VON WETTSTEIN und SCHIFFNER, Exp. 1901: Estado de São Paulo, zwischen Sacramento und Jaguará am linken Ufer des Rio Grande Typus in Herb. Lugd. Bat. sub no. 937.95—6.

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compiled by

J. J. SMITH

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